ARMSTRONG'S INDUSTRIAL INSULATIONS

- ✓ CORKBOARD
- ✓ CORK COVERING
- ✓ MINERAL WOOL BOARD
- ✓ FOAMGLAS*
- ✓ HEAT INSULATION MATERIALS
- ✓ INSULATING REFRACTORIES

ARMSTRONG CORK COMPANY

BUILDING MATERIALS DIVISION

LANCASTER • PENNSYLVANIA

PC Corp.

ARMSTRONG'S INDUSTRIAL INSULATIONS AND COMPLETE CONTRACT SERVICE FOR TEMPERATURES FROM —300° TO 2800° F.

The efficiency and dependability of every insulation job are determined by three factors.

The first is **quality of materials,** for without quality, maximum insulating efficiency and long-range dependability cannot be attained.

The second is **excellent workmanship,** for the best insulation cannot perform efficiently or give long service unless it is properly installed.

The third is **correctly engineered specifications** to assure that both materials and methods of installation are suited to the conditions of the job.

All three of these vitally necessary factors are provided by Armstrong's Insulation Contract Service.

1. Insulation materials of proved efficiency

The trend toward the use of extremely high or low temperatures in modern industrial processing and power generation, and the use of lower temperatures in the preservation and handling of food, demands insulations that offer a maximum of dependable service and thermal efficiency.

The following insulating products cover the industrial temperature range from 300° below zero to 2800° F. By establishing long and satisfactory performance records on the job, these insulations have proved their ability to stand up in any practical application.

For temperatures from 300° F. below zero to 50° F. above.
- Armstrong's Cork Covering
- Armstrong's Corkboard
- Armstrong's Mineral Wool Board
- Foamglas

For various temperatures from 50° F. to 1900° F.
- 85% Magnesia Pipe Covering and Block
- Diatomaceous Earth Pipe Covering and Block
- Mineral Wool Insulations
- Laminated Asbestos Paper Pipe Covering, Sheets, and Blocks
- Cellular Asbestos Pipe Covering and Block
- Wool Felt and Hair Felt Pipe Covering

For temperatures from 1600° to 2800° F.
- Armstrong's Insulating Fire Brick

2. Skilled Workmanship

The efficiency of an insulation in service depends greatly upon the skill with which it is installed. Skilled superintendents and crews of experienced mechanics capable of installing correctly outdoor and indoor work, high or ground level jobs, large or small installations, are maintained in Armstrong offices in leading industrial areas.

3. Engineering Service

Costly delays and improper application of insulation can be eliminated by competent job planning and engineering "know-how." Armstrong engineers have a background of practical experience acquired during almost 50 years of specifying insulation to control conditions ranging from special low-temperature processing equipment to the heat treating of steel. As a result, these men are fully qualified to solve insulation problems involving any temperature condition. Feel free to ask any Armstrong office or distributor for aid in developing your plans.

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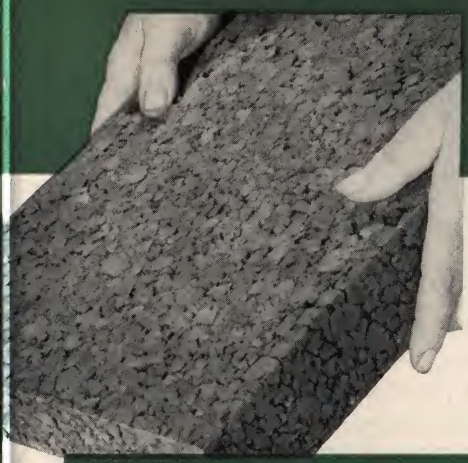
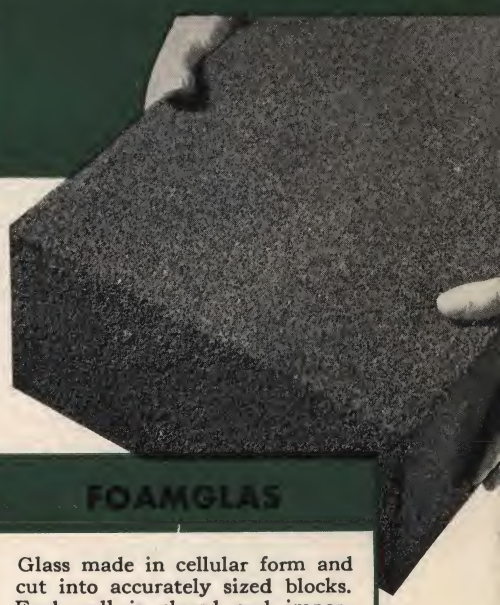
ARMSTRONG'S LOW-TEMPERATURE INSULATIONS





	CORKBOARD*	MINERAL WOOL BOARD	FOAMGLAS
Composition	Made entirely of granules of pure cork compressed and baked into board form. Cork's structure is cellular and its minute air-filled cells effectively resist the passage of heat.	This insulation is mineral wool with a waterproof binding agent, is processed to form a strong homogeneous board and cut to accurate size.	Glass made in cellular form and cut into accurately sized blocks. Each cell is closed and impervious to air or water. Foamglas is fireproof and permanent.
Insulating Efficiency	Thermal coefficient is 0.27 Btu at 60° F.	Thermal coefficient is 0.33 Btu at 75° F.	Thermal coefficient is 0.40 Btu at 50° F.
Moisture Resistance	Cork's cellular structure provides lasting resistance to moisture.	Both the mineral wool and the binding agent are waterproof and will not absorb water.	Permanently vaporproof. Absorbs no water.
Weight	0.65 lb. per board ft.	Approximately 1.25 lbs. per board ft.	10 to 11 lbs. per cubic foot. (.833 to .95 lb. per board ft.)
Structural Strength	Strong and tough and will not settle, sag, shrink, swell, or warp. Self-supporting to a height of 14'.	Self-supporting to a height of 11' and will stay in place without sagging, settling, shrinking, swelling, or warping.	Block is rigid and wall insulation will support insulated ceiling construction. Average compressive strength 150 psi.
Workability	Easily cut and worked with a wood saw and other ordinary tools. Readily shaped to fit curved surfaces.	Readily handled and erected with ordinary tools. Can be shaped to curved surfaces.	May be cut with a saw or knife and is easily shaped.
Odor	Free from any objectionable or contaminating odor.	Free from any objectionable or contaminating odor.	Odorless except when being cut for installation. (Dissipates immediately.)
Bond with Finishing Materials	Portland cement plaster and asphalt emulsion plastics bond securely.	Portland cement plaster and asphalt emulsion plastics bond securely. Do not use portland cement plaster on ceilings.	Secure bond with asphalt emulsion plastics. Do not use portland cement plaster.
Sizes	12" x 36", 18" x 36", 24" x 36", 36" x 36". Thicknesses 1", 1½", 2", 3", 4", 6". Regranulated cork available for filling irregularly shaped spaces.	12" x 36". Thicknesses 1", 1½", 2", 3", 4". Regranulated mineral wool available for filling irregularly shaped spaces.	12" x 18". Thicknesses 2", 3", 4", 5"
Factory Finish	Standard Corkboard . . . no finish Super-Service Corkboard . . . asphaltic coating, both sides. Mastic Finish Corkboard . . . ⅛" asphalt mastic finish, one side.	No finish.	No finish.
Federal Specification	Conforms to HH-C-561b.	Conforms to HH-M-371.	No specification.
Other Qualities	Fire resistant Resists decay Will not harbor vermin	Fire resistant No tendency to rot, mold, or harbor vermin	Fireproof Verminproof Not affected by temperature, moisture, or age.

*Armstrong's Cork Covering has essentially the same characteristics as corkboard. See details on page 17.

**Data supplied by Pittsburgh Corning Corporation.

ADDITIONAL PROPERTIES OF FOAMGLAS**

Coefficient of Expansion (°F.)	.0000045 in	Absorption (Water)	0
Specific Heat	.200 Btu per lb.	Impact Strength	66 ft. lbs.
Average Crushing Strength	150 lbs./sq.in.	Air Infiltration or Permeability	0
Modulus of Rupture	130 lbs./sq.in.	Capillarity	0

FACTORS IN SELECTING INSULATION

Choice of low-temperature insulation material will depend, in part, on such factors as:

Local Cost for Refrigeration
Type of Construction
Local Climatic Conditions
Temperature Range to Be Controlled
Weight Requirements
Rigidity or Flexibility Requirements
Fire Resistance
Moisture Resistance
Structural Strength

Armstrong's line of insulations—Corkboard, Cork Covering, Mineral Wool Board, and Foamglas—makes possible the selection of a material that exactly meets the requirements of each job. Armstrong's Corkboard and Cork Covering have established such a long record of efficient service that they are today the standard of comparison for materials in their field. Mineral Wool Board and Foamglas are more recent additions to the Armstrong Line, with distinctive features that make them specially useful under certain conditions. All are efficient, dependable, and backed by the Armstrong reputation for quality and satisfaction.

DESIGN STANDARDS FOR LOW-TEMPERATURE WORK

Where insulation is a barrier between two temperatures, an unbalanced condition exists. Natural forces struggle constantly to restore normal balance by means of a heat flow from the hot to the cold side of the barrier.

Adequate and efficient insulation, more than any other factor, will determine the final economy of a cold room or refrigerated building. Cold storage rooms may be located in any part of the building and may be built as single or multiple units. Multiple rooms are more flexible in use and generally more economical in operation. Such rooms should be built in one block, if possible, for greatest economy of space, piping, refrigeration, and insulation. Partitions and ceilings between sharp freezers and other higher-temperature rooms should be heavily insulated. Freezers should not be located in a basement or under a cooler. Coolers may be located under a freezer.

CONSTRUCTION

Structural walls, floors, and ceilings should be of solid construction. Monolithic concrete or solid brick with flush joints is recommended wall construction. Avoid air spaces such as occur in hollow tile, cinder or concrete block, and sheathed studs or joists. If such spaces are unavoidable, as in an existing building, they should be left as open as possible for free air circulation. Where building walls are not used as a base for the insulation, self-sustaining or solid insulation walls are recommended for partitions and interior walls. When the ceiling height is greater than that needed for the cold room, a dropped ceiling is recommended to conserve refrigeration.

DOORS

The doorway of a refrigerated room is the point where the greatest loss due to infiltration occurs. It is true economy to use a well-built door made by a reputable manufacturer specializing in this field. Doors of many types are designed to meet the many different requirements of both temperature and service.

AIRPROOFING

The problem of air infiltration requires attention in all refrigerated constructions. This is always present to a certain extent and the resultant vapor condensation is harmful whether it occurs in the building structure or in the insulation. Solid concrete or masonry construction aids airproofing. If brick are used they should be hard and dense. All masonry walls, except smooth-finished concrete, should receive a ½" coat of portland cement plaster, and all surfaces should be additionally airproofed with Armstrong's No. 3 Asphaltic Paint. This priming paint seals against vapor passage and provides a strong bond for the asphalt used in erecting the insulation. It has a high film strength, does not flow at maximum wall temperatures, penetrates into the pores of the walls, is easily applied, and its desirable weatherproofing qualities improve with age.

FINISHES

Insulation should receive a finish which will give long service under the temperature and moisture conditions common to cold storage rooms. The finish should bond securely to the insulation and be reasonably resistant to bumps and abrasion. Cost, good appearance, and availability should also be considered. These requirements are best met by asphalt emulsion finishes or portland cement plaster. In areas where insulation is subjected to excessive bumping or abrasion, the finish should be protected with wainscoting or bump rails.

GUIDE TO INSULATION THICKNESS

In insulating a refrigerated room, the first consideration in determining what thickness to use is the temperature at which the room will operate. In addition, other design factors must be considered and the final insulation thickness selected accordingly. For example:

Ripening rooms for bananas, tomatoes, etc., are usually operated at 56 to 60 degrees Fahrenheit with 90 to 95% humidity, and require extra insulation because of the humidity and the accurate control required.

Extra insulation should be used on ceilings which form the roofs of buildings where summer temperatures are high or long periods of hot weather prevail. Depending upon whether the room is on or below grade or suspended above grade, different insulation thickness may be used on the floor than on the walls and ceiling.

Partitions and ceilings between freezers and higher temperature rooms should be heavily insulated. Without special provisions, freezers should not be located on or below grade. Freezers should not be located under coolers. Coolers may be located under freezers.

The table at the right lists thicknesses of insulation generally considered to be good practice for normal conditions in most sections of the country. Since the factors outlined above can effect either an increase or decrease in these suggested thicknesses, the nearest Armstrong office should be consulted for a recommendation.

		Cork-board	Mineral Wool Board	Combination Foamglas and Corkboard	Foamglas
Coolers	50° F.	2	2	3″ Foamglas 1″ Corkboard	5″
	45° F.	3	3		
	40° F.	4	4	3″ Foamglas 2″ Corkboard	6″
	30° F.	4	5	3″ Foamglas 2″ Corkboard	6″
Freezers	20° F.	5	6	3″ Foamglas 3″ Corkboard	8″
	10° F.	5	6	3″ Foamglas 3″ Corkboard	8″
	5° F.	6	7	3″ Foamglas 4″ Corkboard	9″
	0° F.	6	7	3″ Foamglas 4″ Corkboard	9″
Sharp Freezers	−5° F.	7	9	3″ Foamglas 5″ Corkboard	11″
	−10° F.	7	9	3″ Foamglas 5″ Corkboard	11″
	−15° F.	7	9	3″ Foamglas 5″ Corkboard	11″
Super Freezers	−20° F.	8	10	3″ Foamglas 6″ Corkboard	12″
	−25° F.	9	11	3″ Foamglas 7″ Corkboard	14″
	−30° F.	10	12	3″ Foamglas 8″ Corkboard	15″
	−35° F.	10	12	3″ Foamglas 8″ Corkboard	15″

RECOMMENDED COLD ROOM TEMPERATURES

Product	Recommended Temp. °F.
Apples	30 to 32
Asparagus	32
Avocados	40 " 55
Bananas (holding)	56
Beef (fresh)	32 " 34
Beer (barrels)	45
Berries (fresh, 10 days)	31 " 32
Butter (short carry)	35
Butter (long carry)	−10 " 0
Cabbage	32
Cantaloupes	32 " 34
Carrots	32
Celery	31 " 32
Cheese	approx. 34
Chocolate (dipping room)	65
Cream (short carry)	20 " 25
Cream (long carry)	0 " 20
Eggs	30 " 35
Fish (fresh)	33 to 40
Fruits (dried)	32 " 50
Furs (dressed)	25 " 35
Grapes	30 " 32
Hams (not brined)	20 " 35
Honey	36 " 45
Ice	28
Ice Cream	15
Lard	32 " 33
Lemons	55 " 58
Livers	20 " 30
Maple Syrup and Sugar	40 " 45
Meats (canned)	30 " 40
Meats (brined)	35 " 43
Meats (fresh)	33 " 35
Melons	35 " 40
Milk	32 " 38
Nursery Stock	30
Nuts (in shells)	30 " 40
Oleomargarine	−10 to 0
Onions	32
Oranges	32 " 34
Oysters (tubs)	25 " 35
Oysters (shells)	33 " 43
Peaches	31 " 32
Pears	29 " 31
Pork (fresh)	32 " 34
Potatoes	38 " 50
Quick-frozen foods—to freeze	−15 " −40
Quick-frozen foods—to store	−10 " 0
Raisins	40 " 45
Salt Meat—Curing Room	32
Sauerkraut	35 " 38
Sausage Casings	40 " 45
Scallops (frozen)	16
Tobacco	35 " 42
Wines	40 " 50
Woolens	25 " 28

The following applications are the ones most generally used in the construction of small cold storage rooms. Engineering cooperation in the solution of special problems is freely offered by the Armstrong Cork Company.

BACK PLASTER—Where the corkboard insulation is to be applied against masonry walls in asphalt, the walls must be made true and even, if necessary, with portland cement mortar, mixed: 1 part portland cement, 3 parts clean, sharp sand. Immediately preceding the application of the plaster, wet the walls evenly with clean water. Apply the plaster in one or more coats to ¼" minimum thickness on all high points, straighten with a straightedge, and bring to a smooth float finish.

Where necessary, to ensure a good bond, the existing wall surfaces must be roughened or hacked before applying the plaster.

ASPHALTIC PRIMING PAINT—All brick, concrete, or plastered surfaces to which the corkboard insulation is to be applied in hot asphalt must be primed with Armstrong's No. 3 Asphaltic Paint, applied with either brush or spray. The surfaces must be thoroughly dry before the priming paint is applied, and the paint must be allowed to dry before erection of the insulation.

JOINTS—All joints shall be tight and lapped in successive layers in order to minimize air infiltration.

NAILS AND SKEWERS—Use special galvanized nails 1" longer than the thickness of the first layer of corkboard to nail it against wood wall, column, and ceiling surfaces. Use nails 7½" long to toenail in solid corkboard partitions.

Use treated hardwood skewers to additionally secure the second and succeeding layers of corkboard on walls, columns, or ceilings.

Drive skewers at an angle. Their length shall be approximately twice the thickness of the corkboard being applied. For each layer two nails or skewers per square foot shall be used on all walls and columns; three nails or skewers per square foot shall be used on all ceilings, beams, and solid corkboard partitions.

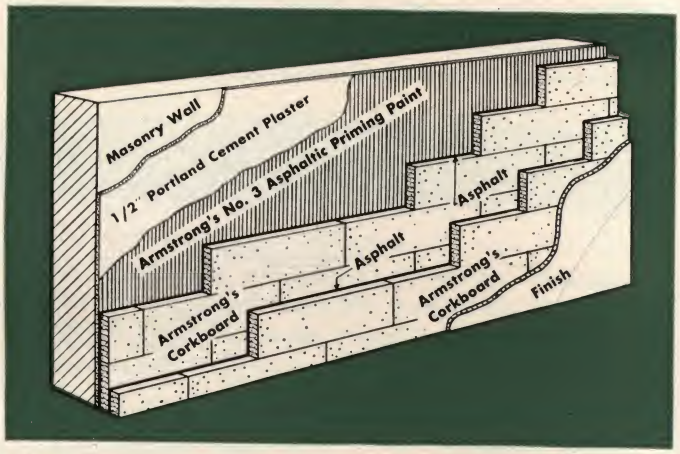
WALLS

MASONRY WALLS—Two Layers of Corkboard—Both in Hot Asphalt—All masonry wall surfaces must be thoroughly cleaned of dirt, dust, loose mortar, etc., and, where necessary, be made true and even as described under "Back Plaster." After the plaster has dried, prime the wall with Armstrong's No. 3 Asphaltic Priming Paint, as described under "Asphaltic Priming Paint."

Apply the first layer of Armstrong's Corkboard directly to this surface in hot asphalt.* Apply the second layer in hot asphalt and additionally secure it to the first layer with treated hardwood skewers. Finish the exposed cork surfaces as described under "Finishes" on page 11.

NOTE: *Where only one layer of corkboard is used, apply as described above for the first layer.*

*½" portland cement mortar, mixed 1 part portland cement and 3 parts clean, sharp sand may be used in place of the "Back Plaster" and asphalt for erecting the first layers of corkboard.

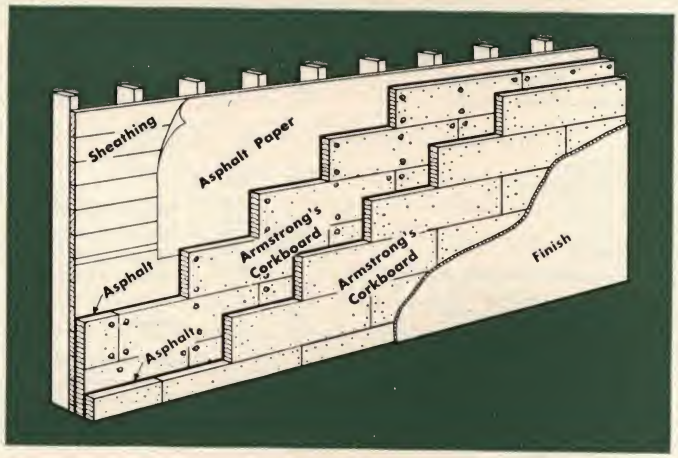


WOOD WALLS—Two Layers of Corkboard—Both in Hot Asphalt—Directly against the sheathing of the wood walls tack one layer of heavy asphalt paper lapped not less than 3" at all edges.

Apply the first layer of Armstrong's Corkboard in hot asphalt and secure it to the wood wall with special galvanized nails. Apply the second layer in hot asphalt and additionally secure it to the first layer with treated hardwood skewers.

Finish the exposed cork surfaces as described under "Finishes."

NOTE: *Where only one layer of corkboard is used, apply as described above for the first layer.*



SOLID CORKBOARD WALLS—Two Layers of Corkboard—Asphalt or Cement Core—Erect temporary 2 x 4 studs on 18" centers in alignment as a guide for self-supporting solid corkboard walls. Erect first layer of Armstrong's Corkboard against temporary studs.

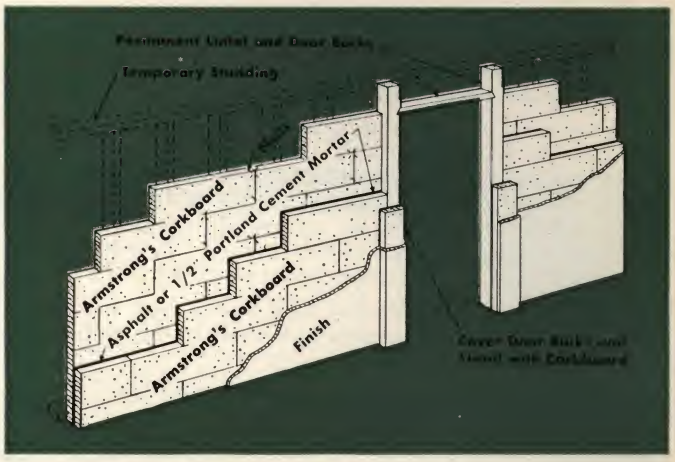
Toenail each piece of corkboard to abutting ones, and where possible to walls, floor, and ceiling with special galvanized nails.

(a)—Erect the second layer against the first in hot asphalt and secure it to the first layer with treated hardwood skewers; or—

(b)—Erect the second layer against the first one in ½" of portland cement mortar, mixed 1 part portland cement and 3 parts clean, sharp sand, and additionally secure it to the first layer with treated hardwood skewers.

Finish the exposed cork surfaces as described under "Finishes." Do not remove the temporary studs until the finish on opposite face of the wall has set.

NOTE: *Where only one layer of corkboard is used, apply as described above for the first layer.*



CEILINGS

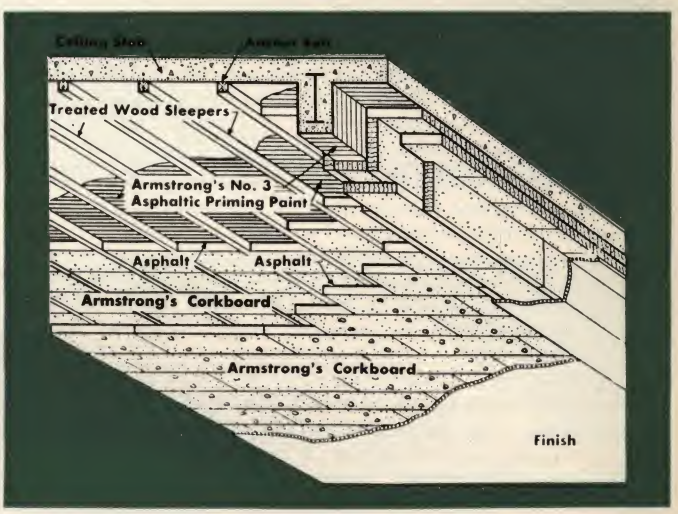
CONCRETE—Two Layers of Corkboard—Both in Hot Asphalt—Fasten to the underside of the concrete ceiling slab 1⅝" x — (*thickness of the first layer of corkboard*) sleepers with suitable anchors. The anchors and sleepers must be spaced so that the corkboard will fit tightly between, but not more than 18" apart. The concrete ceiling slab must be thoroughly cleaned of all dirt, dust, loose plaster, etc., and be primed as described under "Asphaltic Priming Paint."

Apply the first layer of Armstrong's Corkboard in hot asphalt, between the sleepers, and toenail it to the sleepers with special galvanized nails.* Apply the second layer at right angles to first layer in hot asphalt and additionally secure it to the first layer with treated hardwood skewers. Where the second layer crosses the sleepers, nail it with special galvanized nails at each sleeper.

Finish the exposed cork surfaces as described under "Finishes."

NOTE: *Where only one layer of corkboard is used, apply it as described above for the first layer.*

*½" portland cement mortar, mixed 1 part portland cement and 3 parts clean, sharp sand, may be used in place of the above method for applying the first layer of corkboard. The corkboard must then be propped in place until securely bonded to the concrete ceiling slab.

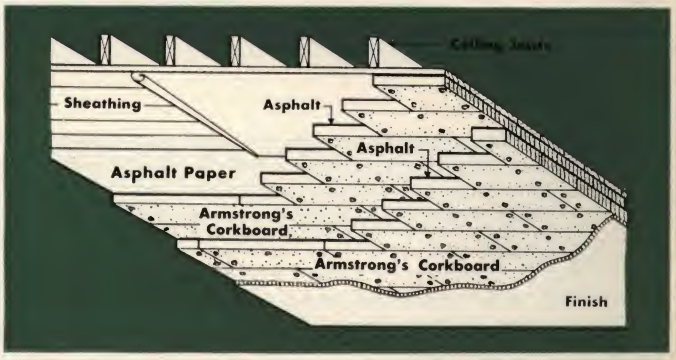


WOOD CEILING (Insulation Underneath)—Two Layers of Corkboard—Both in Hot Asphalt—Directly against the underside of the wood ceiling, tack one layer of heavy asphalt paper with edges lapped not less than 3".

Apply the first layer of Armstrong's Corkboard in hot asphalt and secure it to the wood ceiling with special galvanized nails. Apply the second layer in hot asphalt and additionally secure it to the first layer with treated hardwood skewers.

Finish the exposed cork surfaces as described under "Finishes."

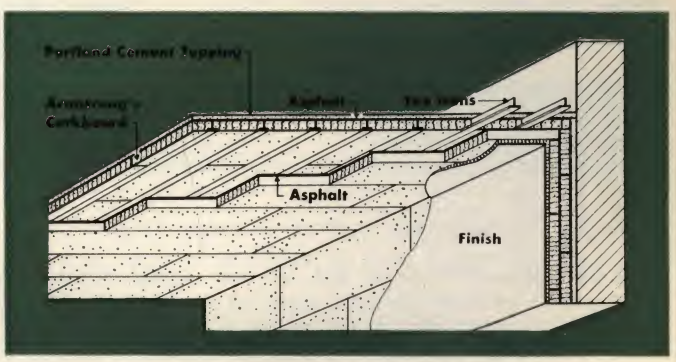
NOTE: *Where only one layer of corkboard is used, apply it as described above for the first layer.*



TEE-IRON CEILING—Two Layers of Corkboard—First Layer Fitted Between Tees; Second Layer Beneath in Hot Asphalt—Space the tee-irons 12" or 18" apart. Place the first layer of Armstrong's Corkboard between the tee-irons, notching the edges to fit snugly the flanges of the tee-irons. Flood the top surface with a heavy coat of hot asphalt and apply 1" of portland cement topping mixed 1 part portland cement and 3 parts clean, sharp sand.

Apply the second layer against the underside and at right angles to the first layer in hot asphalt and additionally secure it to the first layer with treated hardwood skewers.

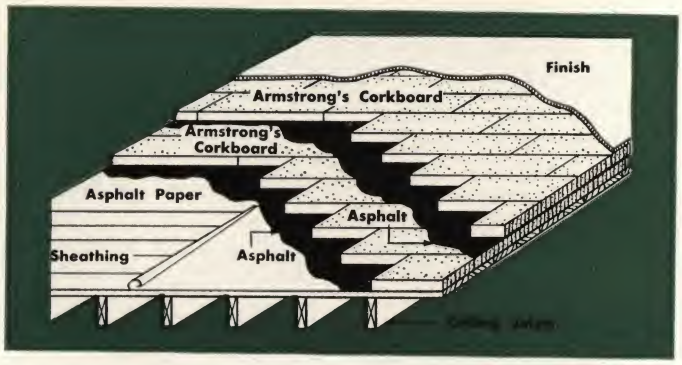
Finish the exposed cork surfaces as described under "Finishes."



WOOD CEILING OR ROOF (Insulation on Top)—Two Layers of Corkboard—Both in Hot Asphalt—Provide slot one inch (1″) wider than the thickness of the wall insulation along all walls so that the wall and ceiling insulation will join.

On top of wood deck, tack layer of heavy asphalt paper lapped 3″. Apply the first layer of corkboard in hot asphalt. Apply the second layer of corkboard in hot asphalt. Flood the top surface of the insulation with a heavy coat of hot asphalt or mop the top surface with hot asphalt and lay one layer of fifteen (15) pound saturated roofing felt in hot asphalt with all edges lapped and sealed. Tightly seal this membrane along all walls.

NOTE: *Where only one layer of corkboard is used, apply it as described above for the first layer and flood the top surface with a heavy coat of hot asphalt.*



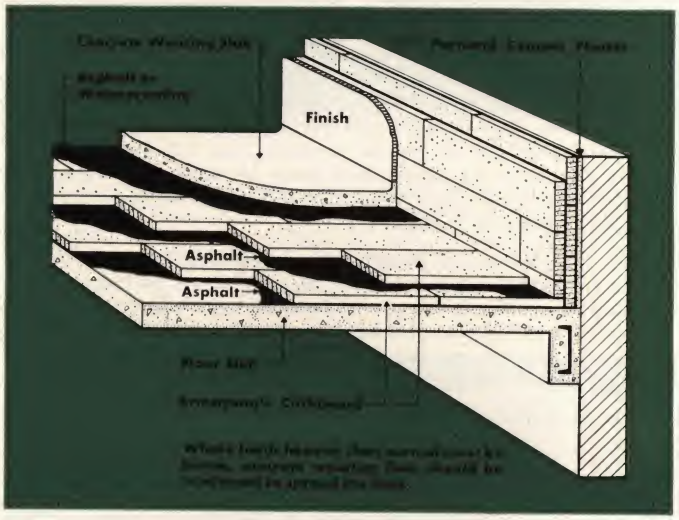
FLOORS

CONCRETE FLOOR—Two Layers of Corkboard—Both in Hot Asphalt—The concrete base or floor on which the insulation is to be laid must be dry and reasonably smooth and level. Apply the first layer of Armstrong's Corkboard in hot asphalt. Apply the second layer in hot asphalt.

Flood the top surface heavily with hot asphalt or apply a waterproofing membrane consisting of two layers of fifteen (15) pound saturated roofing felt, each layer being mopped in place with hot asphalt. Flash this membrane up nine (9) inches high and seal it along all walls and around all columns. On top of this insulation install a wearing floor as described under "Concrete Wearing Floors" on page 12.

WOOD FLOOR—Two Layers of Corkboard—Both in Hot Asphalt—On top of the wood floor apply one layer of heavy asphalt paper with all edges lapped not less than 3″ and sealed with hot asphalt.

Proceed from this point as specified under "Concrete Floor."



COLUMNS

SQUARE CONCRETE COLUMNS—Prime columns with Armstrong's No. 3 Asphaltic Priming Paint. Apply Armstrong's Corkboard in hot asphalt. Apply second layer in hot asphalt and secure to first layer with treated hardwood skewers.

Finish the exposed cork surfaces as described under "Finishes."

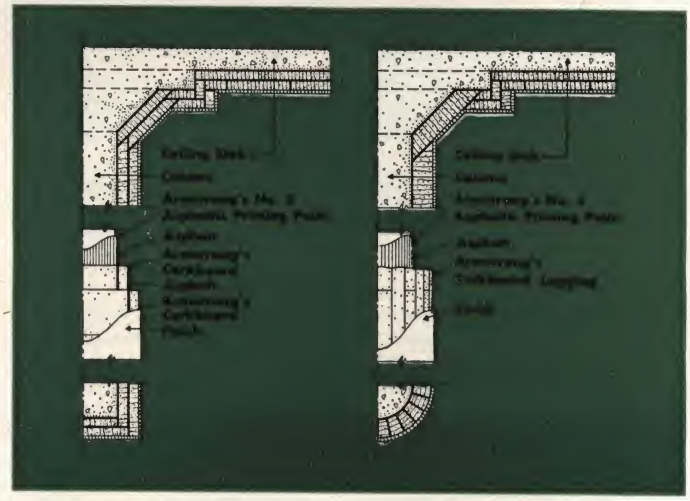
ROUND CONCRETE COLUMNS—Prime columns with Armstrong's No. 3 Asphaltic Priming Paint. Apply cork lagging, properly beveled to fit the column, in hot asphalt and toenail to abutting lags with treated hardwood skewers.

Finish the exposed cork surfaces as described under "Finishes."

SQUARE WOOD COLUMNS—Prime columns with Armstrong's No. 3 Asphaltic Priming Paint. Apply Armstrong's Corkboard in hot asphalt and secure it to the wood columns with galvanized nails of proper length, 3 per square foot. Apply second layer in hot asphalt and secure to first layer with treated hardwood skewers.

Finish the exposed surfaces as described under "Finishes."

STEEL COLUMNS—Remove all dirt and rust. Apply Armstrong's Corkboard in waterproof cement, propping in place until cement has set. Apply second layer in hot asphalt and secure to first layer with treated hardwood skewers.



NOTE: *All vertical corners shall be protected with suitable angle corner guards, securely fastened to the column before the finish is applied. Round columns shall have sheet metal guards.*

Methods of Installing Mineral Wool Board

Because Armstrong's Mineral Wool Board is strong and rigid, it can be handled in most instances in the same manner as Armstrong's Corkboard. Consequently, specifications for the erection of corkboard can be used in erecting mineral wool board, with the exception of the specifications which are noted on this page.

WALLS

MASONRY WALLS—Same specification as for corkboard.

WOOD WALLS—Same specification as for corkboard.

SOLID MINERAL WOOL BOARD WALLS—Same specification as for solid corkboard walls.

CEILINGS

CONCRETE—Two Layers of Mineral Wool Board—Both Applied in Hot Asphalt—Fasten to the underside of the concrete ceiling slab 1⅝″ x — (*thickness of first layer of mineral wool board*) sleepers with suitable anchors. The anchors and sleepers must be spaced so that the mineral wool board will fit tightly between, but not more than 18″ apart. The concrete ceiling slab must be thoroughly cleaned of all dust, dirt, loose plaster, etc., and be primed as described under "Asphaltic Priming Paint."

Apply the first layer of Armstrong's Mineral Wool Board in hot asphalt between the sleepers and toenail it to the sleepers with special galvanized nails. Apply the second layer at right angles to the first layer and in hot asphalt. Where the second layer crosses the sleepers, nail it with special galvanized nails and caps at each sleeper. Finish as described under "Finishes" on page 12.

NOTE: *Where only one layer of mineral wool board is used, apply it as described above for the first layer.*

WOOD DECK—Same specification as for corkboard.

WOOD—(Insulation Underneath)—Two Layers of Mineral Wool Board—Both in Hot Asphalt—Directly against the underside of the wood ceiling, tack a layer of heavy asphalt paper with edges lapped not less than 3″.

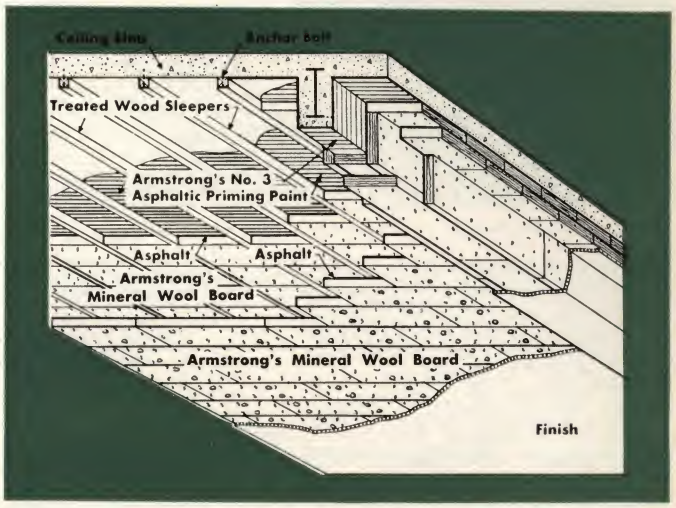
Apply the first layer of Armstrong's Mineral Wool Board in hot asphalt and secure it to the wood ceiling with special galvanized nails and caps. Apply the second layer in hot asphalt and secure it with nails and caps, the nails being at least ¾″ longer than the combined thickness of the two layers. Finish as described under "Finishes" on page 12.

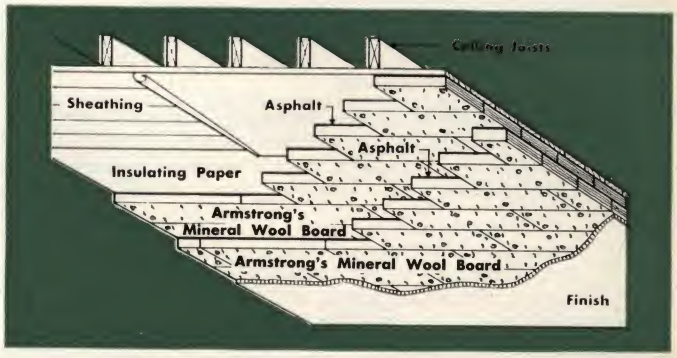
NOTE: *Where only one layer of mineral wool board is used, apply it as described above for the first layer.*

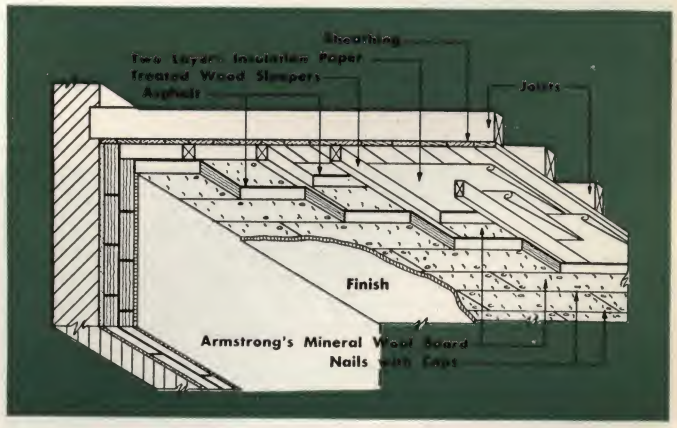
WOOD—(Insulation Underneath)—Two Layers of Mineral Wool Board—Both in Hot Asphalt—Freezer Room—Applies to Mineral Wool Board Only—Directly against the underside of the wood ceiling, tack two layers of waterproof insulating paper with edges lapped not less than 3″. Fasten to the underside of the wood ceiling 1⅝″ x — (thickness of the first layer of mineral wool board) wood sleepers with suitable anchors, spaced either 12″ or 18″ apart.

Apply the first layer of mineral wool board in hot asphalt and secure it to the wood ceiling with special galvanized nails and caps face nailed to the wood sheathing and toenailed to the wood sleepers. Apply the second layer in hot asphalt, prop to insure a good bond, and additionally secure it with treated wood skewers and nails and caps face nailed to the wood sleepers, the nails being at least ¾″ longer than the second layer of insulation. Finish the exposed mineral wool board surfaces as described under "Finishes" on page 12.

For thicknesses requiring three layers of insulation, where the total thickness of the second and third layers will not permit face nailing a minimum of ¾″ into the wood sleepers, additional wood sleepers must be erected in the same manner in the second layer running in opposite directions to those in the first layer and anchored to them.







FLOORS—Same specification as for corkboard.

COLUMNS—Same specification as for corkboard.

COLD ROOM INSULATION . . . Combination

To provide positive protection against damaging vapor penetration, Armstrong engineers have developed a new insulation construction combining layers of Armstrong's Corkboard on the interior of the insulated area with a layer of Foamglas insulation as the outer shell.

This construction utilizes the best properties of both materials to their full extent. The outer shell of Foamglas performs a sealing function and provides high insulating value. Since this material is glass in cellular form, with each minute cell completely sealed and isolated from adjoining cells, it is absolutely moistureproof, vaporproof, and fireproof. The use of Foamglas in this construction thus fortifies the natural moisture resistance of corkboard and supplements its recognized high thermal efficiency, making one of the best insulation constructions yet devised. (See physical data table on page 3.)

RECOMMENDED THICKNESSES—COMBINATION

Temperature Range	*Foamglas plus Corkboard*		*Total*
Rooms 45° F. and above	3″	1″	4″
Rooms 35° to 45° F.	3″	1″	4″
Ripening Rooms	3″	2″	5″
Rooms 20° to 35° F.	3″	2″	5″
Rooms 5° to 20° F.	3″	3″	6″
Rooms —5° to 5° F.	3″	4″	7″
Rooms —15° to —5° F.	3″	5″	8″
Rooms —25° to —15° F.	3″	6″	9″

WALLS

MASONRY WALLS—Combination Foamglas and Corkboard—Both Materials Applied in Hot Asphalt

All masonry wall surfaces shall be thoroughly cleaned of dirt, dust, loose mortar, etc. Where necessary, wall surfaces shall be made true and even as described under "Back Plaster." After the plaster has dried, prime the wall as described under "Asphaltic Priming Paint" on page 6.

Apply the first layer of Foamglas directly to this surface in hot asphalt. The additional layer or layers of corkboard shall be applied by dipping in hot asphalt. Finish the exposed corkboard surface as described under "Finishes" on page 11.

NOTE: *It is not necessary to back plaster masonry walls of rooms to be held at temperatures above freezing.* (CAUTION: *In northern regions where extremely low outside temperatures are experienced for sustained periods, it is advisable to back plaster all masonry surfaces.*)

WOOD WALLS—Combination Foamglas and Corkboard—Both Materials in Hot Asphalt

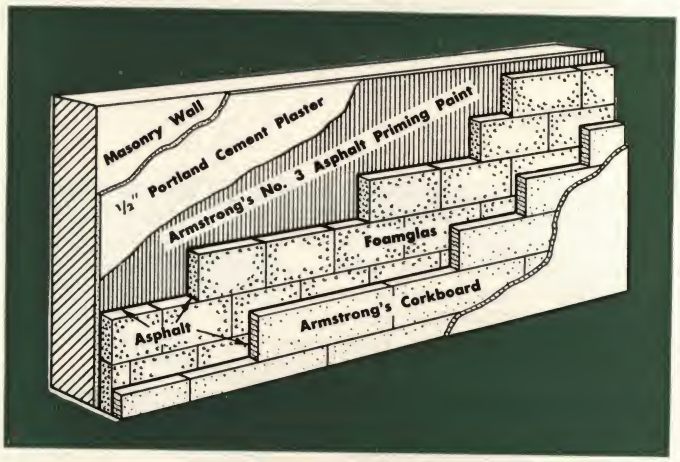
Although it is not necessary to support these with wood wall construction, the following specifications hold when they are to be applied to wood sheathed walls.

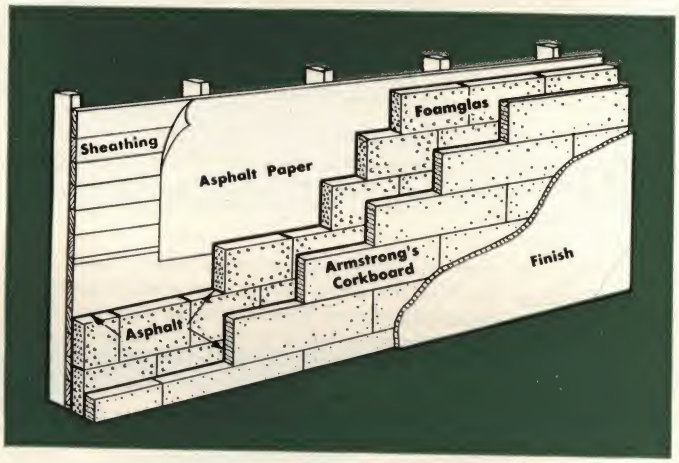
Directly against the wood sheathed walls tack one layer of heavy asphalt paper, with edges lapped not less than 3″. Apply the first layer of Foamglas directly to this paper in hot asphalt. The additional layer or layers of corkboard shall be applied in hot asphalt. Finish the exposed corkboard surface as described under "Finishes."

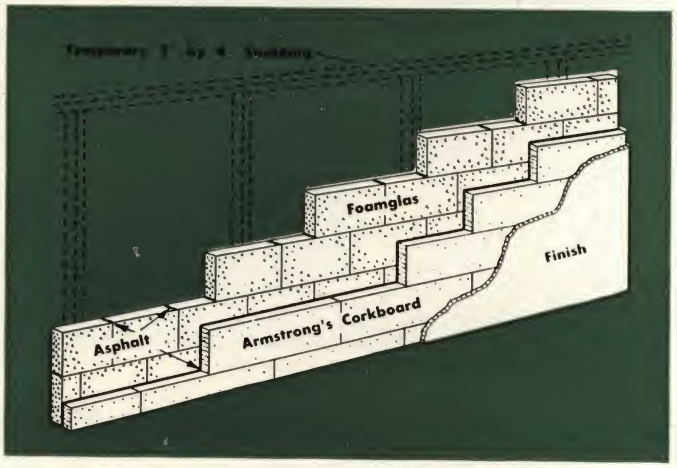
SOLID WALLS—Combination Foamglas and Corkboard—Both Materials in Hot Asphalt

Erect temporary 2″ x 4″ studs on 4′ to 6′ centers in alignment as a guide for the self-supporting solid partition or wall.

Erect the first layer of Foamglas on edge against the temporary studs, dipping the bottom and vertical edge in hot asphalt. The additional layer or layers of corkboard shall be applied in hot asphalt. Finish the exposed corkboard surface as described under "Finishes" on page 11.







CEILINGS

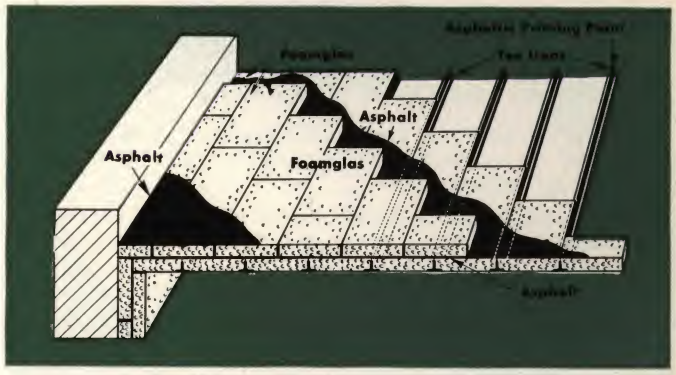
TEE-IRON CEILINGS—Two Layers of Foamglas—First Layer Fitted Between Tees; Second Layer on Top in Hot Asphalt

Space the tee-irons on 12″ or 18″ centers.

Before fitting the first layer of Foamglas, the tee-irons shall be given one good coat of Armstrong's No. 3 Asphaltic Priming Paint. Shape the blocks of Foamglas for the first layer so that they will snugly fit the tee-iron flanges. This can be accomplished by rubbing the blocks between two tee-iron sections (12″ or 18″ centers) securely spiked on a plank. Roughen surfaces of the tee-iron sections with a cold chisel to facilitate the cutting and forming of the Foamglas blocks.

Place the first layer of Foamglas between the tee-irons, dipping edges only in hot asphalt and fitting joints snugly. Apply the second layer directly on top of the first layer in hot asphalt. Flood the top surface with a heavy coat of hot asphalt.

Finish the exposed under surface of Foamglas and tee-irons as described under "Finishes for Foamglas" on page 12.

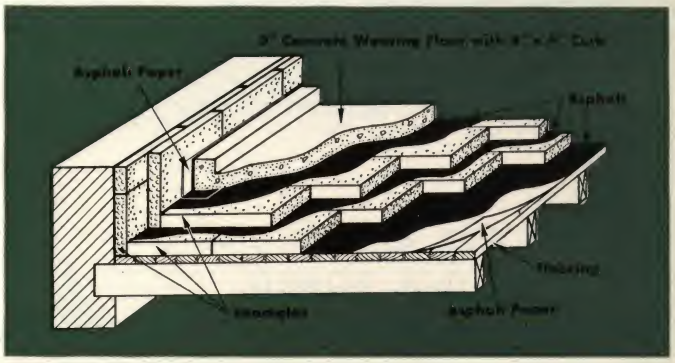


FLOORS

WOOD FLOOR—Two Layers of Foamglas—Both in Hot Asphalt

Directly on top of the wood base floor apply one layer of heavy asphalt paper, securely tacked in place with all edges lapped not less than 3″ and sealed with asphalt.

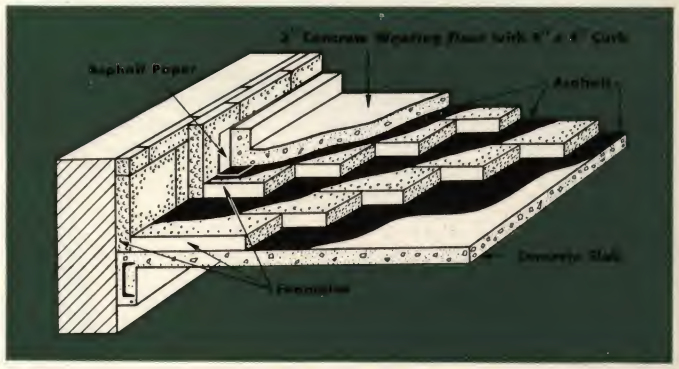
Flood or mop the surface of this paper with hot asphalt and lay the first layer of Foamglas in the asphalt. Flood the surface of the insulation with hot asphalt and lay the second layer in the asphalt. Flood the top surface with a heavy coat of hot asphalt. Install on top of the insulation a wearing floor with a 4″ x 4″ curb as described under "Concrete Wearing Floors."



CONCRETE FLOOR—Two Layers of Foamglas—Both in Hot Asphalt

The concrete floor on which the insulation is to be laid shall be reasonably smooth and level.

Flood or mop the concrete surface with hot asphalt and place the first layer of Foamglas in the asphalt. Flood the surface of the insulation with hot asphalt and place the second layer in the asphalt. Flood the top surface with a heavy coat of hot asphalt. Install on top of the insulation a wearing floor with a 4″ x 4″ curb as described under "Concrete Wearing Floors."



FINISHES FOR ARMSTRONG'S CORKBOARD

ASPHALT EMULSION FINISH—Finish the exposed corkboard surfaces with Armstrong's Asphalt Emulsion Finish, mixed 50 gals. Armstrong's Asphalt Emulsion, 115 lbs. asbestos floats, 275 lbs. (2¾ cu. ft.) dry, screened sand, and 15 gals. clean water. Apply directly to the corkboard surfaces in two coats, each approximately ⅛″ thick. Before applying first coat, point up all open joints, voids, or broken corners with this mixture. Do not apply second coat until first coat is hand dry. Trowel second coat smooth. Final thickness will be approximately ⅛″.

ARMSTRONG'S S. P. EMULSION FINISH (READY MIXED)—(Smooth finish) Apply Armstrong's S. P. Emulsion directly to the surface of the corkboard and trowel smooth.

(Sand finish) Apply to the exposed corkboard surfaces Armstrong's Asphalt Emulsion, mixed 50 gals. S. P. Emulsion, 175 lbs. (1¾ cu. ft.) dry, screened sand, and a small amount of water. Apply as described under "Armstrong's Asphalt Emulsion Finish."

ARMSTRONG'S MASTIC FINISH—This finish, approximately ⅛" thick, is ironed on Armstrong's Corkboard at the factory. Fill and seal all joints with mastic seam filler. Finish all convex corners with Armstrong's Mastic Finish Quarter Round.

NOTE: *Do not apply any emulsion finishes when the temperature is below 40° F. In cold weather, provide heat in areas where the finish is being applied.*

NOTE: *Asphalt Emulsion finishes should not be used where they are subject to temperatures lower than 25° F. below zero.*

PORTLAND CEMENT FINISH—Use portland cement plaster mixed 1 part portland cement, 3 parts clean, screened sand, and 5% hydrated lime. Apply in two coats each approx. ¼" thick. Key first coat thoroughly to insulation and scratch. After first coat is dry, apply second coat and bring to even surface with straightedge and trowel or float smooth. Minimize cracking by scoring in 4' squares, with score marks which penetrate to first coat. Protect outside corners with metal corner beads. Note: *The finish can be strengthened, and cracking further minimized by use of galvanized metal lath or wire netting securely fastened to surface of insulation with 1¼" galvanized staples or short, large-headed nails.*

FINISHES FOR ARMSTRONG'S MINERAL WOOL BOARD

ASPHALT EMULSION FINISHES—Apply to mineral wool board walls or ceilings in the same manner as described under "Finishes for Armstrong's Corkboard." Before applying brush mineral wool board lightly to remove loose particles and dust.

PORTLAND CEMENT FINISH—(For use on mineral wool board walls and columns, NEVER ON CEILINGS) Prime the mineral wool board surfaces with a cement wash consisting of equal parts of portland cement and water. Follow immediately with the first coat of portland cement finish mixed and applied as described above under "Finishes for Armstrong's Corkboard."

FINISHES FOR FOAMGLAS

NOTE: *Do not use portland cement plaster on Foamglas surfaces.*

ASPHALT EMULSION FINISH—Finish the exposed Foamglas surfaces with Armstrong's Asphalt Emulsion Finish, mixed 50 gals. Armstrong's Asphalt Emulsion, 115 lbs. asbestos floats, and 15 gals. clean water. Apply directly to the Foamglas surfaces in two coats, each approximately ⅛" thick. Before applying the first coat, point up all open joints, voids, or broken corners with this mixture. Apply second coat when first coat is hand dry. Trowel second coat smooth. Final thickness will be approximately ⅛".

ARMSTRONG'S S. P. EMULSION FINISH (READY MIXED)—Smooth Finish—Apply Armstrong's S. P. Emulsion directly to the exposed Foamglas surfaces in two coats, each approximately ⅛" thick, and trowel smooth.

NOTE: *Do not apply any asphalt emulsion finish when the temperature is below 40° F. In cold weather, provide heat in the area where the finish is being applied.*

NOTE: *Asphalt Emulsion finishes should not be used where they are subject to temperatures lower than 25° F. below zero.*

PAINTING

The finish (emulsion or portland cement plaster) should be thoroughly dry and clean of dirt, grease, loose mortar, etc., before painting. This dirt can usually be removed by brushing.

ARMSTRONG'S ALUMINUM PAINT—Apply in two coats, flowing on each coat. Allow the first coat to dry before the second coat is applied. To prevent the aluminum paint from going out of solution it should not be mixed until it is to be used.

CONCRETE WEARING FLOORS

CONCRETE WEARING FLOOR—Over the insulation install a monolithic concrete wearing floor 3" thick at the low point (unless otherwise specified) sloped 1" in 10' 0". (Slope should be increased for floors subject to extreme moisture conditions, as in milk rooms, ice cream plants, etc.)
The concrete shall be mixed 1 part portland cement, 2 parts clean, sharp sand, 3 parts crushed stone. The concrete shall be floated and troweled to a smooth surface and slightly coved at all vertical surfaces to form easily cleaned corners.

INDUSTRIAL

Factory and mill roofs are commonly insulated (1) to maintain the exact conditions of temperature and humidity which are necessary in the processing of many materials, and (2) to prevent the damage to goods, structure, and machinery caused by condensation and the resultant drip which occurs when moist warm air comes in contact with a cold ceiling.

The amount of heat loss through ordinary roof construction is considerable and can be greatly reduced by application of roof insulation. For example:

> Transmission per sq. ft. for 70° F. difference in temperature through 4″ concrete slab deck covered with standard roofing, per hour .....50.4 Btu.
>
> Transmission for the same construction and conditions with the addition of 2″ of Armstrong's Corkboard on the roof, per hour .....8.4 Btu.

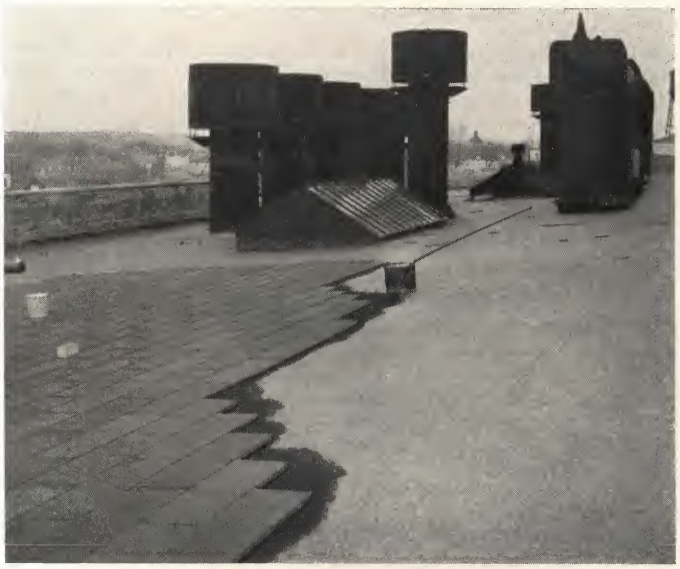
In this case, the heat flow was reduced 83% with the addition of 2″ of Armstrong's Corkboard. This means the ceiling can be kept at or very near room temperature, and condensation is overcome.

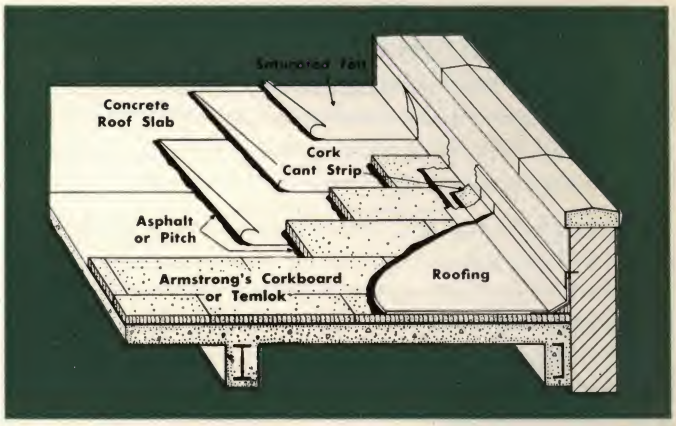
Large temperature differentials and high humidity in industrial installations make necessary an exceptionally durable, highly moisture-resistant insulating material. Armstrong's Corkboard is recommended for such applications because it offers maximum insulating efficiency, resistance to moisture, and structural stability.

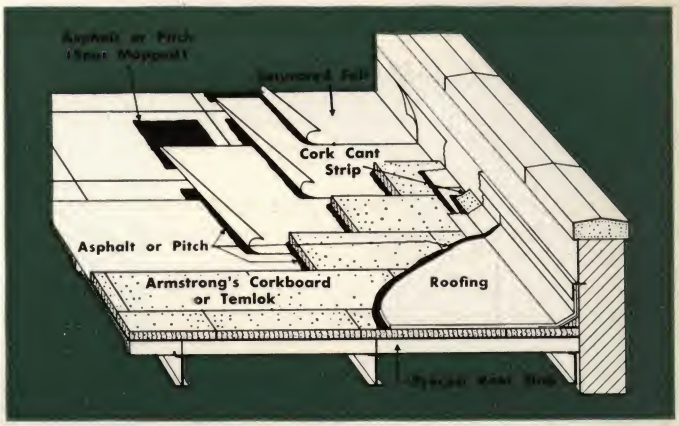
COMFORT

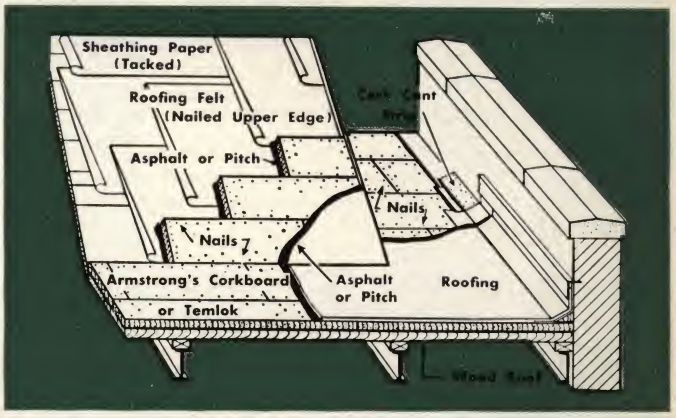
Roofs of office buildings, apartments, commercial structures, and homes are insulated (1) to increase the comfort of tenants and patrons by making the structure cooler in summer, warmer in winter, and (2) to save fuel in winter, and lower the cost of operating air-conditioning systems in summer.

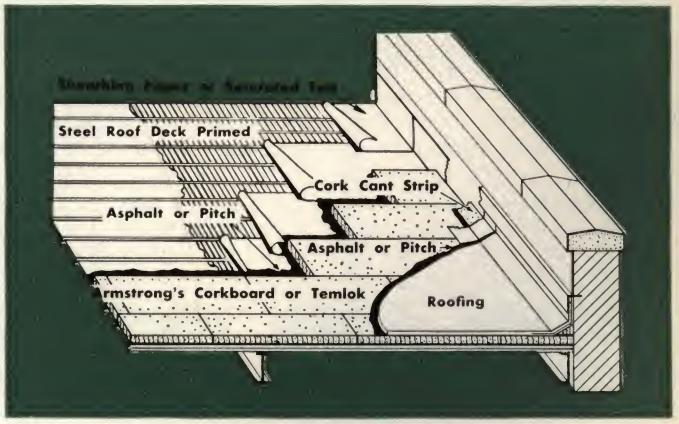
For this type of job, where normal conditions of moisture are encountered, Armstrong's Temlok fiberboard insulation is highly satisfactory. Made of long-leaf Southern pine, this material is highly efficient and has natural moisture resistance.











The air-conditioning system, if it is to operate satisfactorily, must be able to deliver its conditioned air with a minimum of heat or refrigeration loss through the duct walls. Such loss causes a variation in delivered air temperature at different points in the system—a factor of great importance.

Armstrong's Corkboard insulation properly applied to ducts and other air-conditioning apparatus, such as air washers and fan housings, will greatly improve the overall thermal efficiency and the operating characteristics of the system. It will also prevent moisture condensation and consequent drip from air-conditioning duct and equipment surfaces.

GENERAL RECOMMENDATIONS

The engineer who designs an air-conditioning system can best specify the thickness of insulation which will assure efficient performance of the equipment.

Apply corkboard insulation in one layer. For moderate temperature differences and short ducts, use 1-in. corkboard on supply ducts, leaving return ducts bare.

For heavy duty, and on long ducts or on fans and dehumidifiers, use 1½-in. or 2-in. corkboard with 1-in thickness on return ducts. Where ducts are constructed with standing seams, use a thickness of corkboard which will cover the seams.

ARMSTRONG'S CORKBOARD

DI Corkboard—12″ x 36″ x ½″. Coated on one side with a moisture-resistant asphalt plastic film. It is used for the insulation of air-conditioning ducts where the main purpose is to prevent damaging condensation.

Standard Corkboard—12″ x 36″, 18″ x 36″, and 24″ x 36″ sizes, and 1″, 1½″, and 2″ thicknesses are most commonly used to minimize heat losses as well as prevent damaging condensation in air-conditioning equipment.

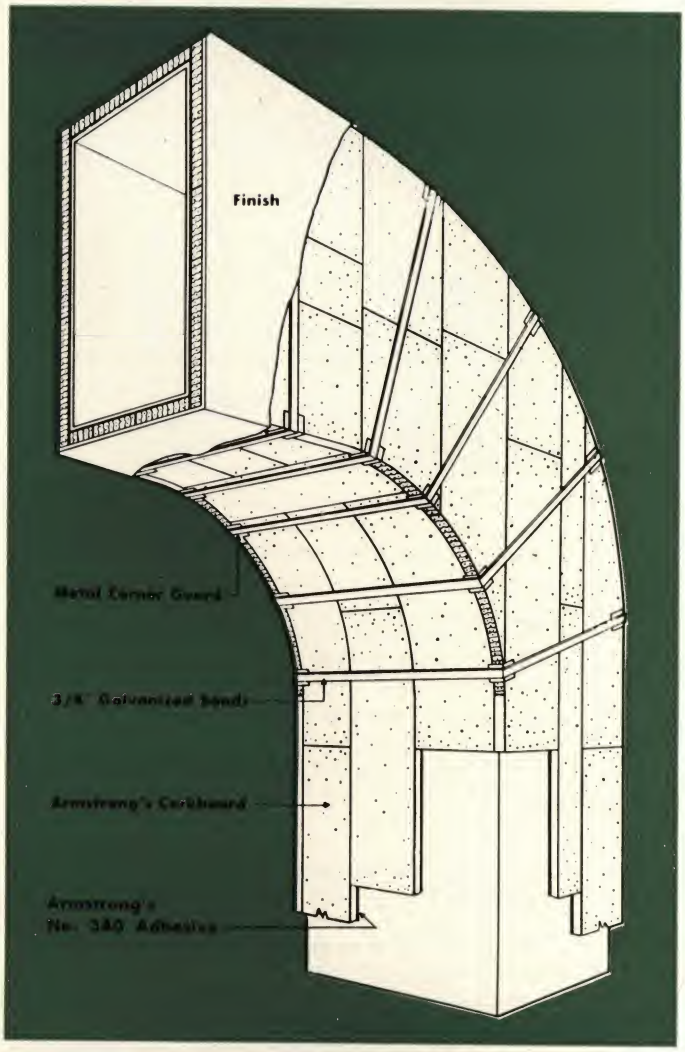
APPLICATION

Adhesive Method—Surfaces must be clean and free from dust, dirt, grease, and moisture. Spread Armstrong's No. 340 Adhesive over entire face of corkboard approximately 1/16″ thick and apply corkboard to metal surface. Additionally secure corkboard with metal bands or copper-clad wire ties 12″ on center, using metal corner guards. Point all joints with asphalt plastic.

Mechanical Method—Duct surfaces shall be clean and free from dust, dirt, grease, and moisture. Apply suitable metal fasteners beforehand directly to the duct, using proper erection adhesive. Apply corkboard directly to duct and secure fasteners through corkboard.

Hot Asphalt Method—Surfaces must be clean and free from dust, dirt, grease, and moisture. Apply Armstrong's No. 4 Asphaltic Paint to metal surfaces. Dip corkboard in hot asphalt and apply to duct. Additionally support corkboard with metal bands or copper-clad wire ties 12″ on center, using metal corner guards. Point all joints with asphalt plastic.

NOTE: *This method may prove impractical in cramped quarters or where fumes and smoke from the heating kettle are objectionable, as in an occupied building.*



FINISHES FOR INDOOR DUCTS

Exposed Indoor Ducts and Equipment

Plaster Finish—Cover insulated surfaces with 2″ mesh galvanized wire mesh stapled and laced in place. All exposed corners of the insulation shall be fitted with metal corner beads. Apply asbestos cement plaster in 2 coats not to exceed ½″ in thickness. (Mix ⅓ portland cement, ⅔ asbestos cement.) When dry, paint if desired.

Canvas Finish—Over two thicknesses of rosin-sized paper apply 8-oz. canvas with blind-sewed seams. Size canvas and paint with lead and oil paint, if desired.

Asphalt Emulsion Finish—Apply 2 coats of Armstrong's Asphalt Emulsion Finish to a total thickness of not more than ¼″. When dry, paint if desired, using aluminum for first coat.

Concealed Indoor Ducts—No finish required.

OUTDOOR DUCTS

Surfaces must be clean and free from dust, dirt, grease, and moisture. Apply Armstrong's Corkboard either by the hot asphalt or adhesive method, as described under "Application," at left. Finish as described under "Finishes, Outdoor Equipment," on page 16.

INSULATION OF TANKS AND VESSELS

Tanks and vessels operating at moderate or low temperatures require insulation to minimize refrigeration costs, to permit accurate control of processing temperatures, to prevent condensation of moisture on the outside or inside tank surfaces, or, as is usually the case, for a combination of these reasons. Vessels of any size or shape can be insulated with cork lagging and corkboard applied in a thickness to meet any temperature requirement.

NOTE: *Any brackets, supports, or attachments on the vessels shall be insulated where possible for a distance of 3′ from the outside of insulation on vessels. Insulation shall be of same thickness and finish as on equipment.*

Recommended Thicknesses of Cork Lagging and Corkboard Insulation

Temperature	Thickness
−40° to −25° F.	9″
−25° to −10° F.	8″
−10° to + 5° F.	6″
5° to 20° F.	5″
20° to 35° F.	4″
35° to 50° F.	3″
50° to 65° F.	2″

EQUIPMENT OVER 54″ IN DIAMETER

Cylindrical tanks, towers, vessels, and equipment over 54″ in diameter shall be insulated with multiple layers of corkboard, scored and bent to fit the contour of the vessel. After the surface of the vessel has been primed with Armstrong's No. 4 Asphaltic Paint, each layer of corkboard shall be applied in hot asphalt or waterproof cement, or adhesive. The first layer (2″ thick corkboard) shall be banded immediately after erection with ¾″ wide x 25 gauge galvanized bands spaced on 12″ centers, drawn tight, and securely locked in place with at least two clips per band.

Successive layers of insulation shall be applied as described for the first layer and held firmly in place with treated hardwood skewers. Band for each layer as described for the first layer.

On vessels without flanges, corkboard shall conform to the contours of the heads, and at the intersection of the heads and the shell the insulation shall have interlocking joints and shall be cut to form neat rounded corners, with a thickness of insulation equal to the thickness on the shell.

FINISHES (INDOOR EQUIPMENT)

Asphalt Emulsion Finish—After the insulation has been applied to the required thickness, it should be finished with Armstrong's Asphalt Emulsion Finish applied in two coats. First point up all joints and cracks of the insulation with Armstrong's SP Emulsion. Then apply a coat of Armstrong's SP Emulsion approximately ⅛″ thick directly to the insulation and allow to dry thoroughly. Then apply a second coat of Armstrong's SP Emulsion approximately ⅛″ thick and trowel smooth.

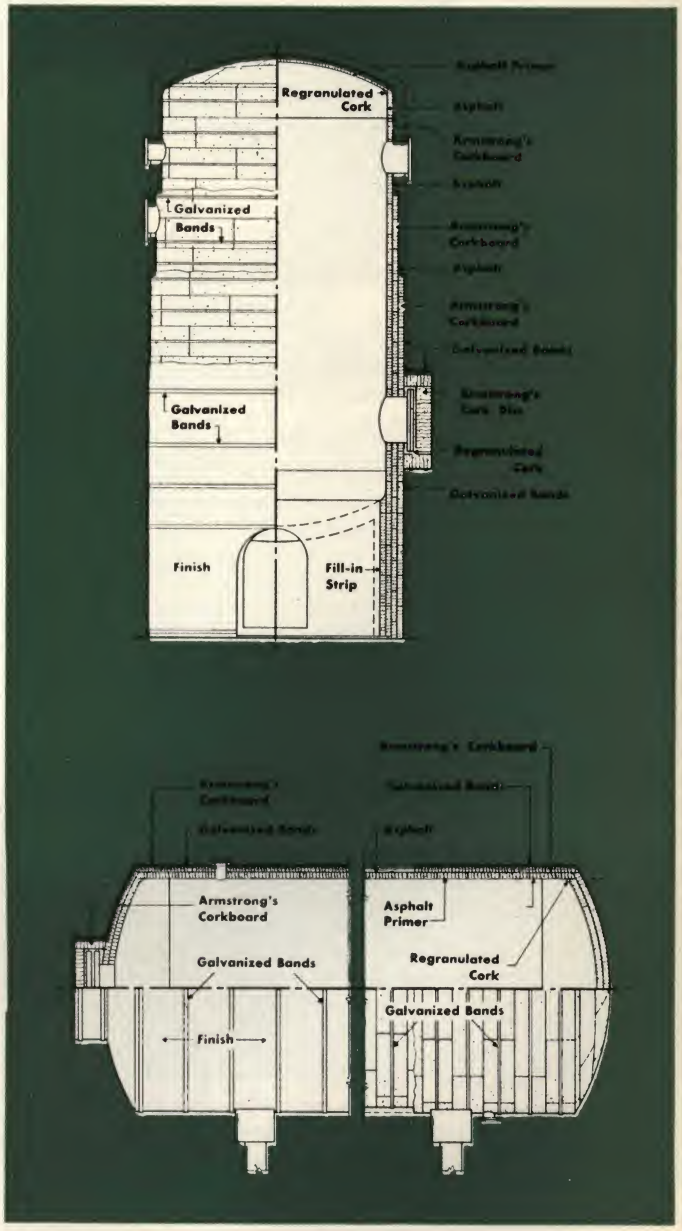
Alternate—First point up all joints and cracks in the insulation with Armstrong's SP Emulsion. Over the insulation apply 1″ hexagonal wire mesh drawn tight and laced at all laps. Then apply ½″ of asbestos cement plaster in two coats. The first coat shall be keyed through the wire mesh, scratched, and allowed to dry before the second coat is applied. The mortar for both coats shall be mixed ⅓ portland cement and ⅔ asbestos cement. The finish coat shall be trowcled smooth.

NOTE: *Where equipment is located outdoors, finish to be as specified on following page.*

EQUIPMENT UNDER 54″ IN DIAMETER

Cylindrical coolers, accumulators, and similar vessels and tanks under 54″ in diameter shall be insulated with a single thickness of cork lagging and discs cut to fit the diameter of the vessel. Lags shall be applied with Armstrong's Waterproof Cement on all joints and erected with joints staggered.

Lags on body or over flanges shall extend beyond the body or flange heads sufficiently to enclose the cork discs which cover the



heads of the vessel. All spaces between the equipment and the insulation shall be filled with brine putty or regranulated cork to eliminate all voids.

FINISH (INDOOR EQUIPMENT)—Finish shall be asphalt mastic ironed on both inner and outer surfaces of the insulation at the factory. Cork lags shall be securely held in place with 1¼" x 18 ga. galvanized bands drawn tight with angle clips and bolts riveted to the bands and spaced approximately on 12" centers. All joints and chipped edges shall be filled and sealed with Armstrong's Seam Filler, and the entire surface shall be given a heavy coat of Armstrong's Asphalt Paint.

NOTE: *Where equipment is located outdoors, finish to be as specified below.*

MANHOLES

Manholes shall be insulated with cork lagging and discs and in same manner as described for the insulation of "Equipment Under 54" in Diameter." Where manholes and flanged heads are to be removable, the cork lags and discs shall be assembled and installed in half sections. Such insulation shall be protected with sheet metal covers and the covers shall be so designed as to be removable.

FINISHES FOR OUTDOOR EQUIPMENT

All insulated equipment located outdoors must be protected against the weather. Wherever 1¼" x 18 ga. galvanized bands with angle clips and bolts have been specified, omit them and substitute ¾" x 25 ga. galvanized bands and clips on 9" centers.

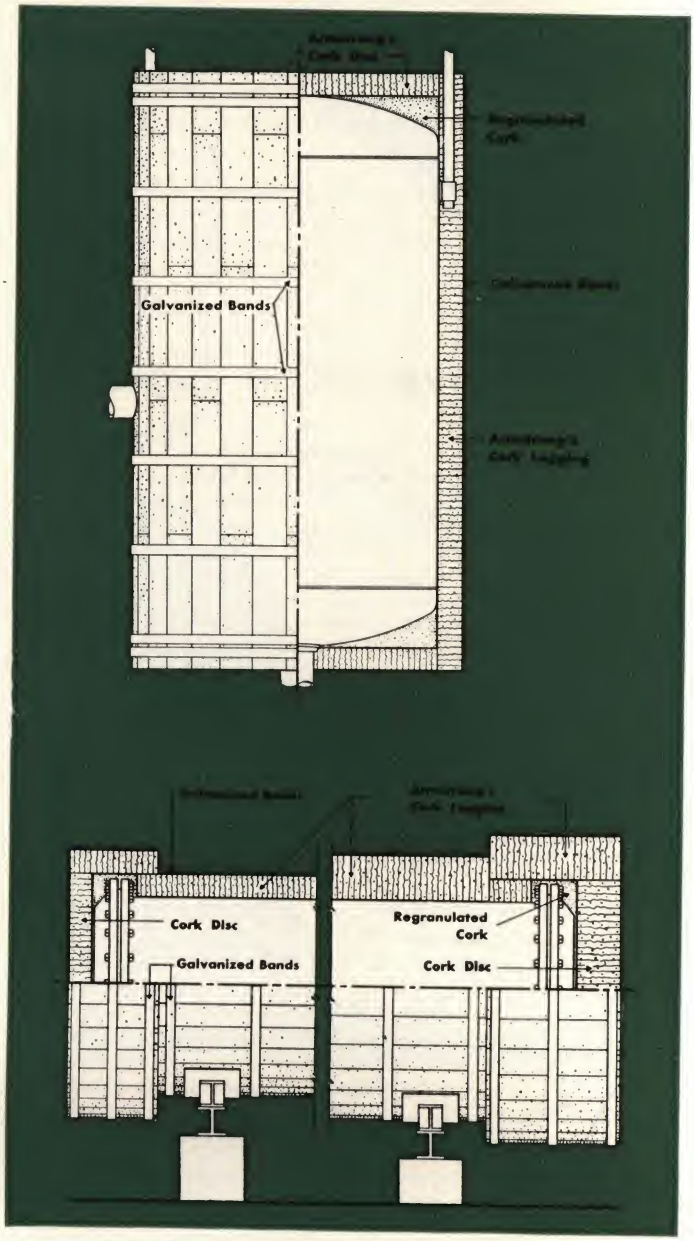
Armstrong's Weatherproof Plastic Finish—The weatherproof finish shall be Armstrong's Weatherproof Plastic approximately ⅛" thick reinforced with Armstrong's Saturated Membrane.

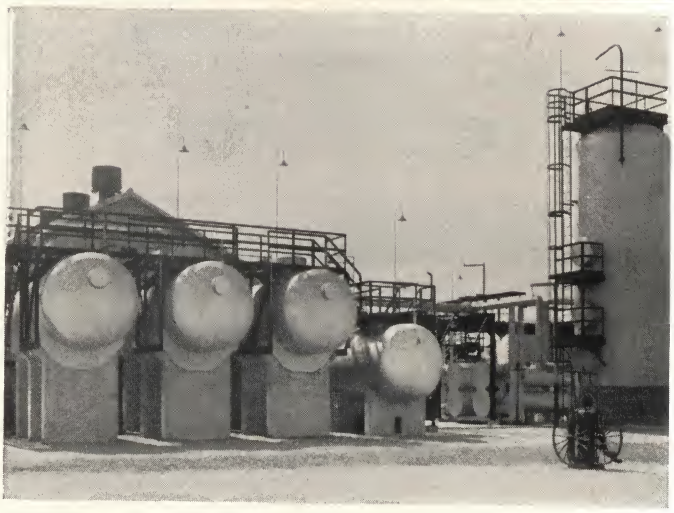
After the insulation has been applied to the required thickness, a coat of Armstrong's Weatherproof Plastic Finish 1/16" thick shall be applied directly to the insulation, and while it is still tacky a layer of Armstrong's Saturated Membrane shall be pressed into the plastic with a trowel. After the solvent has evaporated from the first coat, a second coat approximately 1/16" thick shall be applied to fill the voids and entirely cover the fabric surface.

Alternate—After the cork insulation has been applied to the required thickness, coat the outside surface with a heavy mopping of hot asphalt. Then apply in hot asphalt a layer of heavy asphalt roofing paper properly lapped and sealed in all joints. (For high vertical equipment substitute Armstrong's Insulmastic, see below.) Paper shall be wiped clean of all dust and primed on the tank side with asphaltic paint before erection. The paper shall be held in place with 1¼" x 18 ga. galvanized bands equipped with necessary clips. Clips for tanks over 54" in diameter shall be galvanized Tecktonius clips, and for tanks under 54" in diameter angle clips with take-up bolts shall be used. Bands shall be placed not more than 12" on centers on vertical and horizontal tanks.

Armstrong's Insulmastic Finish—Where a fire-resistant finish is desired, apply Armstrong's Insulmastic in two coats, each approximately ⅛" thick. Dries to a final thickness of ⅛".

On high towers, spherical and cylindrical vessels, elevated lines, etc., 1" galvanized wire mesh should be secured directly to the insulation before Insulmastic is applied.

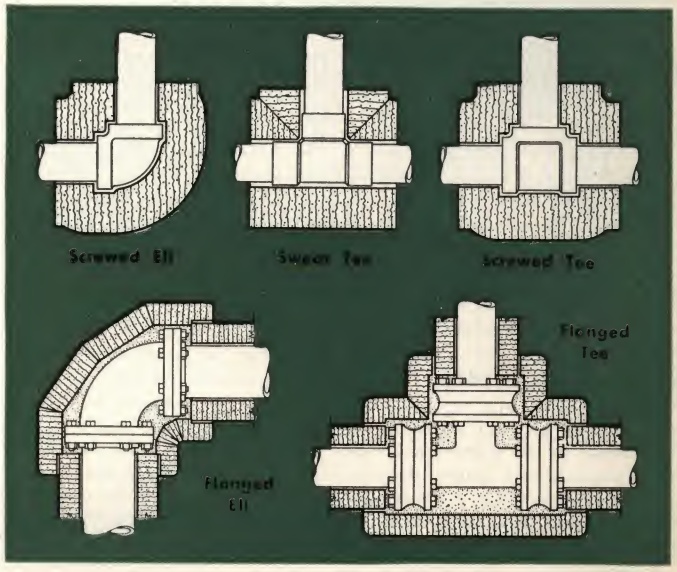




Armstrong's Cork Covering is made from clean granules of cork compressed and baked in molds. After baking, pipe and fitting covers are machined to accurate size and finished with a heavy mastic coating which provides a seal against air and moisture penetration. The use of Armstrong's Cork Covering on cold lines prevents from 80 to more than 90% of the refrigeration loss occurring when lines are left uninsulated and as a result will pay for itself in a few years. It also eliminates condensation and drip with consequent rusting and depreciation of the pipe on lines which operate at above-freezing temperatures and are located in warm areas.

ADVANTAGES OF ARMSTRONG'S CORK COVERING

1—High insulating efficiency.
2—High moisture resistance.
3—Made in exact sizes for easy application to pipes and fittings leaving no space between the cold surfaces and the insulation where frost could accumulate.
4—Provides the same lasting and efficient protection for fittings as on straight pipe runs.
5—Pipe covering sections and fitting covers are rigid and will not sag, allowing space for frost accumulation between insulation and pipe or fitting.
6—Fire resistant.
7—Neat finished appearance.
8—Reasonable cost of material and application.



THICKNESSES

Armstrong's Cork Covering is manufactured in three regular thicknesses and in special thicknesses to meet different service conditions. As is shown below, the actual thickness varies with the pipe size between the minimum and maximum given in each case. All thicknesses are made to fit any size of standard pipe and copper tubing from ¼" up and are furnished in 36" lengths.

1—Heavy Duty Thickness (formerly Special Thick Brine)—2.63 to 4.00 inches thick, for cold lines from 0 to −25° F., or where the surrounding temperatures are unusually high, as in boiler rooms or adjacent to steam lines, or in tunnels or pipe shafts.

2—Standard Thickness (formerly Brine Thickness)—1.70 to 3.00 inches thick, for brine, ammonia, carbon dioxide, or low-temperature gas or liquid lines from 0 to 35° F., or where the maximum temperature difference between refrigerant and surrounding air is less than 100° F.

3—Light Duty Thickness (formerly Ice Water Thickness)—1.20 to 1.93 inches thick, for use on refrigerated drinking water or other cold lines, and for general application where accurate temperatures of 35° and upward are to be maintained.

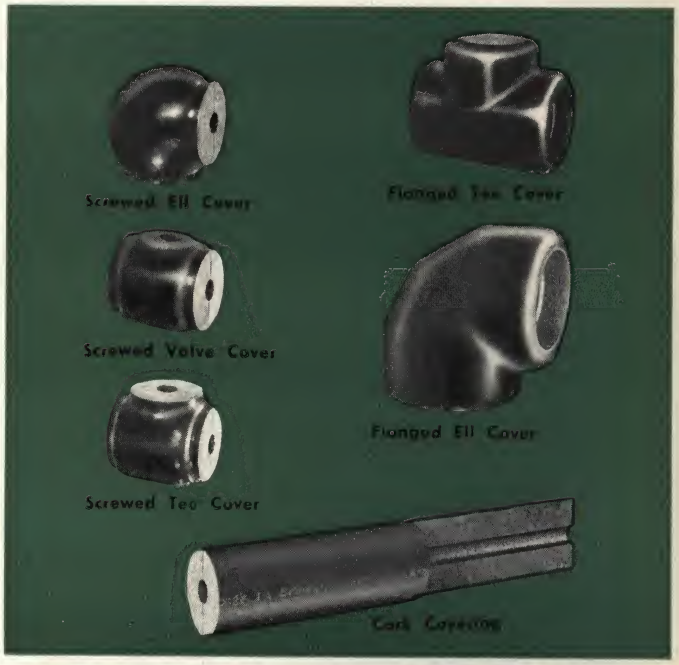
FITTING COVERS

Fitting covers are made in the same thicknesses as pipe covering and are designed for all types of ells, tees, valves, flanges, unions, etc. These fitting covers are rigid and will not sag. They are made to join accurately with the pipe coverings, thus providing the same dependable protection for fittings that straight lengths of covering provide for all other parts of the line.

VALVES AND FLANGED FITTINGS

The insulation on valves must not cover the stuffing box. This may require cutting the bonnet insulation.

Voids between fittings and covering are filled with molten paraffin and granulated cork (Fitting Filler) poured through 1¼" holes several inches apart on the high side of the cover. After filling, the holes are plugged with corks provided for the purpose.



Close Fittings—Where fittings are installed with close nipples or flange-to-flange, the fitting covers must be cut. Do not make entire cut on one fitting cover but cut equally on both. In the case of flanged fittings, provide a bearing for the two cut ends by placing a ring of covering over the flanges where the fitting covers join.

WELDED FITTINGS

Sectional covering is provided for all sizes of weld ells up to 6" pipe size. This includes both 45° and 90° ells. Sectional covering is also fabricated at the factory for weld tees, although these are usually made on the job from pipe covering.

PIPE BENDS

Pipe bends are insulated by mitering regular sectional covering to fit the bend, using pieces small enough to give approximately straightline contact between the pipe and the covering.

HANGERS

Hangers must be on the outside of the covering and not in contact with the pipe. Frost will collect around the supporting rod of a hanger attached directly to the pipe and will eventually work under and split off the covering at that point. Use a 12 to 18 gauge sheet iron shield between the hanger and covering. Two types of hangers are illustrated, at right: the strap hanger for single pipes and the trapeze hanger for two or more pipes.

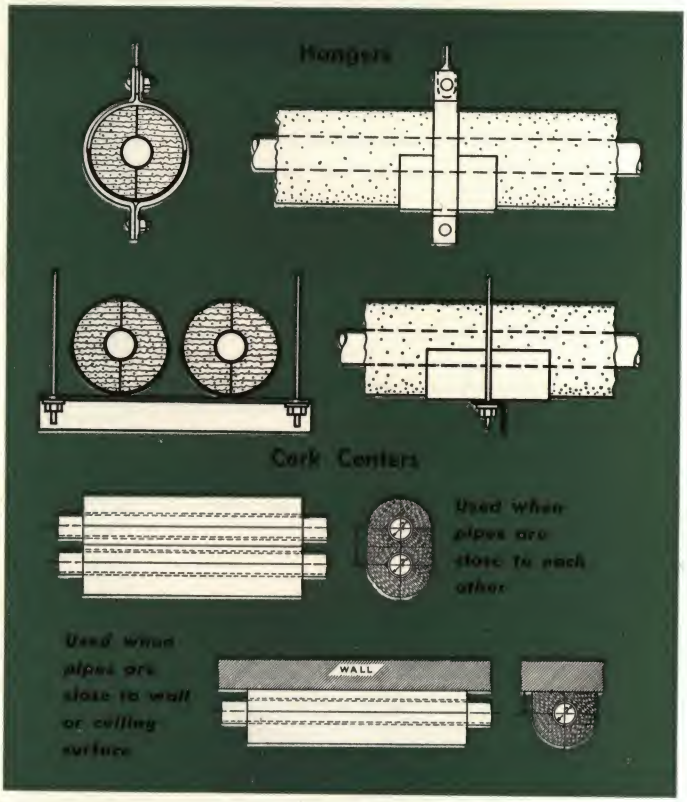
PIPE SPACING

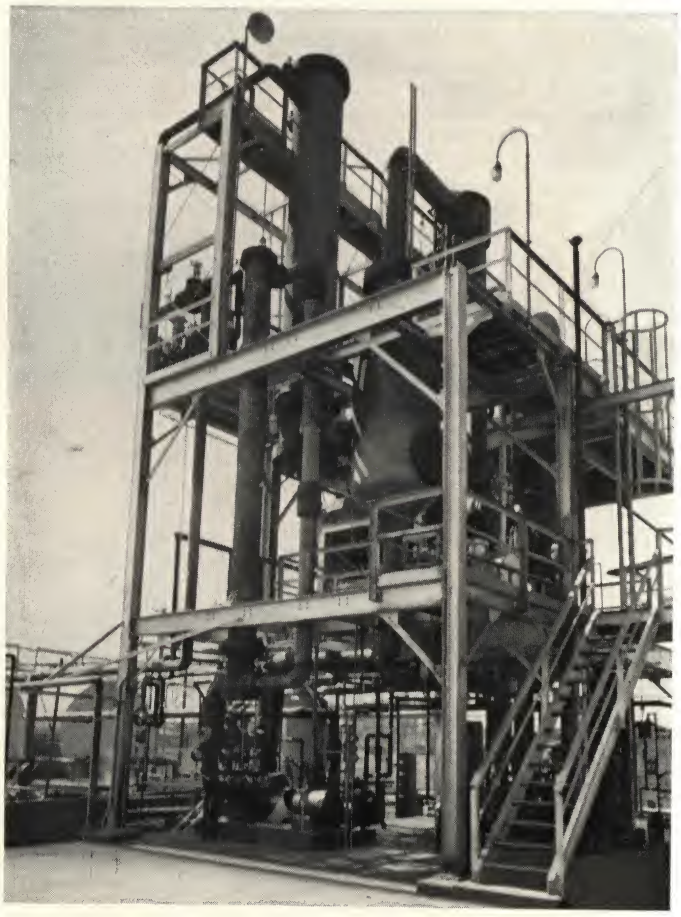
The table below gives the proper spacing of cold lines to allow necessary working space between them without cutting away any of the cork covering. Armstrong's Cork Centers should be used on pipes that are too close to each other or to adjacent wall or ceiling surfaces for the regular covering.

PIPE SPACING TABLE

Covering, Fitting Types, Pipe Sizes	Between Surfaces of Parallel Bare Pipes (inches)	Between Surfaces of Bare Pipe and Adjacent Surface (inches)
Heavy Duty Thickness:		
Screwed Fittings, 1/4" to 3" incl.	10	8
Screwed Fittings, over 3"	18	12
Flanged Fittings	18	12
Standard Thickness:		
Screwed Fittings, 1/4" to 6" incl.	8	6
Screwed Fittings, over 6"	14	8
Flanged Fittings	14	8
Light Duty Thickness:		
Screwed Fittings, 1/4" to 6" incl.	6	4
Screwed Fittings, over 6"	10	5
Flanged Fittings	10	5

Sufficient materials for the proper application of Armstrong's Cork Covering are furnished with the material at no extra charge. They include: Armstrong's Waterproof Cement, for cementing all joints; copper-clad steel wire, for holding the covering in place; galvanized bands and clips, frequently used instead of wire on the larger sizes of pipe covering; Armstrong's Seam Filler, for filling seams, chipped edges, raw ends of covering, etc.; Armstrong's Cork Covering Paint, for painting the outside of the covering; Armstrong's Fitting Filler (crude wax and cork particles), for filling voids between fittings and fitting covers; corks, for plugging the pouring holes in fitting covers.





SPECIFICATIONS FOR APPLICATION OF ARMSTRONG'S CORK COVERING

All lines must test tight. Select Armstrong's Cork Covering and Fitting Covers as outlined in the following schedule:

Below −25° F.	Special Thicknesses
−25 to 0° F.	Heavy Duty Thickness
0 to +35° F.	Standard Thickness
Above 35° F.	Light Duty Thickness

Pipes must be free from plaster, rust, and moisture before applying insulation. Sectional covering shall be applied with end joints broken by starting with one half and one full length piece and longitudinal joints shall be on top and bottom of pipe. Use Armstrong's Waterproof Cement on all joints and wire or band in place with at least six copper-clad wires or ½" galvanized bands per 36" section. All fitting covers are supplied ready for application. Use Armstrong's Waterproof Cement on all fitting cover joints and secure with not less than four copper-clad wires or galvanized bands on screwed fittings and not less than six wires or bands on flanged fittings. Fill all spaces between covers and fittings with Armstrong's Fitting Filler.

NOTE: *With screwed fittings apply fitting covers first; with flanged fittings apply straight pipe covering first.*

Fill all seams and chipped edges with Armstrong's Seam Filler. Apply one good coat of Armstrong's Cork Covering Paint.

Where Armstrong's Cork Lagging is to be applied instead of sectional covering or fitting covers, apply lagging with end joints broken by starting with alternate 18- and 36-inch lengths. Use Armstrong's Waterproof Cement on all joints and secure with copper-clad wires or galvanized bands spaced six inches or less.

NOTE 1: *When pipe passes through an insulated wall into a refrigerated room, the covering shall extend into the refrigerated room at least one inch beyond the wall.*

NOTE 2: *Wall and floor openings must be made large enough to allow for the installation of a full thickness of covering.*

FINISHES FOR ARMSTRONG'S CORK COVERING

Armstrong's Cork Covering Paint—Fill all joints and chipped edges and smooth raw edges of fitting covers with Armstrong's Seam Filler. Apply Armstrong's Cork Covering Paint over entire pipe covering for inside dry rooms.

Canvas Finish—Apply separately one or two layers of 25-lb. rosin-sized paper as specified, lapping edges one inch and staple in place. Stretch 8-oz. canvas tight and sew all seams, three stitches per inch, with four-cord linen sewing twine. All seams if possible to be on top and blind stitched where exposed. Size with good cold-water sizing. When the sizing is dry, apply two coats lead and oil paint of color specified.

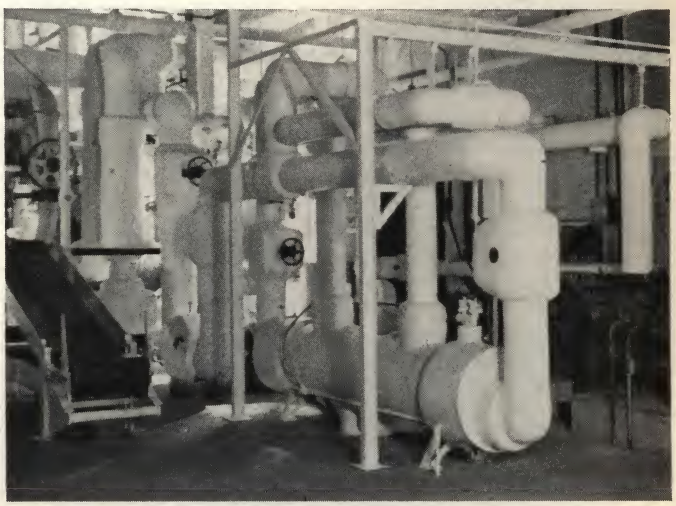
Tape Finish—Fill all joints and chipped edges and smooth raw edges of fitting covers with Armstrong's Seam Filler. Apply membrane tape to fitting covers, using combination of wrapping and stripping to cover all surfaces. Crimp tape over shoulders of fitting covers and fasten loose ends at junction of fitting cover and straight pipe covering by wrapping on straight pipe covering. Wrap tape spirally around straight pipe covering, lapping edges ½ in. and drawing tape tight as it is wrapped. Use 3- to 6-in. tape. Finish with one good coat of Armstrong's Cork Covering Paint.

The following finishes are recommended for lines exposed to weather, wet or humid atmospheres, or running through refrigerated rooms or pipe shafts.

Sectional Pipe Covering—Apply one layer of two-ply roofing paper, lapping at least 2 in. and butting the body of flanged fitting covers and extending over shoulders of screwed fitting covers. Make lap to form a watershed, seal, and secure with coppered staples. All longitudinal laps to be on the side. Wire weatherproofing in place with No. 14 copper-clad wire or ½" galvanized bands on 9-in. centers. Finish with one coat of Armstrong's Cork Covering Paint

Fitting Covers—Apply two coats of Armstrong's Weatherproofing Plastic each approx. 1/16" thick, reinforcing between coats with Armstrong's Saturated Membrane while first coat is still tacky. Bring plastic and reinforcing over edges of fitting covers to form a seal with straight pipe covering.

Should a specific problem arise which calls for the use of a finish other than those covered in the preceding paragraphs, it should be referred to the Armstrong Office serving your locality. Armstrong engineers will be glad to offer their assistance in recommending the proper finish to meet your requirements.



ARMSTRONG'S INSULATION SUNDRIES

The importance of using correct materials to erect, finish, and maintain Armstrong's insulations cannot be overstressed.

Efficient erection, thorough waterproofing and airproofing, lasting durability, and neatness in erecting Armstrong's Corkboard, Cork Covering and Lagging, Mineral Wool Board and Foamglas demand materials created for the purpose.

Armstrong's Insulation Sundries are the result of years of experiment and research in the most effective methods of installing insulation. Each product has been developed to meet a special need. Armstrong engineers are constantly striving to improve methods and materials for the erection and operation of cold rooms.

ERECTION MATERIALS

Armstrong's No. 3 Asphaltic Paint—Asphaltic primer for masonry, concrete, or portland cement plaster surfaces. Prevents air- and moisture-infiltration and provides strong bond when insulation is erected in hot asphalt. Unaffected by temperature changes and strengthens with age. Not a finish. Coverage—100 sq. ft./gal. sprayed (2 coats) or brushed (1 coat); 8½ lbs./gal. Containers: 1-, 5-, and 10-gal. pails and 30-gal. drums.

Armstrong's No. 4 Asphaltic Paint—Asphaltic primer for steel and other metallic surfaces prior to applying insulation in hot asphalt or waterproof adhesives; noncorrosive, rust inhibiting. Extremely impervious to moisture and resistant to acids, alkalies, and chemical fumes; used to protect masonry, concrete, steel, and other metals. Coverage—approx. 150 sq. ft./gal.; 9 lbs./-gal. Containers: 1-, 5-, and 10-gal. pails; 30-gal. drums.

Armstrong's Erection Asphalt—Asphalt for erecting insulation in cold rooms; 180° to 200° F. melting point, odorless. Durable, chemically stable, minimum susceptibility to temperature change, and handles well. Provides strong, permanent air seal for floor, walls, and ceiling installations. Coverage—4/10 lb./sq. ft./layer. Containers: 450-lb. drums (8.6 cu. ft.).

Armstrong's Cold Erection Plastic — Use where hot asphalt is impractical; properties similar to Armstrong's Erection Asphalt except for stronger odor. Not a finish. Coverage—25 sq. ft./gal. in 1/16" coat; 11½ lbs./gal. Containers: 1-, 5-, and 10-gal. pails; 30- and 55-gal. drums.

Armstrong's Galvanized Nails—Hot-galvanized nails with ½" heads and thin shanks for first layer of insulation erection. Coverage—2/sq. ft. on walls and 3/sq. ft. on ceilings. Sizes: 1¾" x No. 10, 12,000 per 100-lb. keg; 2½" x No. 10, 9,000; 3" x No. 9, 6,000; 4" x No. 9, 4,500; 5½" x No. 8, 2,900; 7½" x No. 8, 2,000.

Armstrong's Wood Skewers — Hardwood skewers for application of second and succeeding layers of insulation. Specially treated against mold growth and dry rot. Coverage—2/sq. ft. on walls and 3/sq. ft. on ceilings and solid cork partitions. Sizes: 4" x ¼", 5 lbs./M; 5½" x ¼", 6½ lbs./M; 7" x ¼", 10 lbs./M.

Armstrong's No. 340 Waterproof Cement—Recommended for use in duct insulation suitable for use against metal, concrete, and plaster surfaces; medium bodied, high initial strength, supports weight of insulation without reinforcing, plastic when dry, moisture resistant, and shrinks but little during setting and drying. Must cover complete surface. Coverage—30 sq. ft./gal. when applied with notched trowel; 12½ lbs./gal. Containers: 1- and 5-gal. pails.

FINISHING MATERIALS

Armstrong's Asphalt Emulsion (Aquaseal)—A clay emulsion of finely dispersed, high-grade asphalt is the basic ingredient of Armstrong's Plastic Finish, an airproof and moistureproof plastic finish which can be mixed on the job and troweled directly to the insulation surface. Mix in the proportion of 50 gals. of Armstrong's Asphalt Emulsion with 112 lbs. asbestos fiber, 275 lbs. (2¾ cu. ft.) dry screened sand, and 15 gals. of water. For a sand finish, use this mixture for both first and second coats, trowel spreading to a final thickness of ⅛" when dry. Coverage—15 sq. ft./gal. of asphalt emulsion. Armstrong's Asphalt Finish is also supplied in ready mixed form as Armstrong's Plastic Emulsion.

Aquaseal is also recommended for sealing insulation in refrigerated display cases and equipment. Coverage—1½ to 2½ gals./100 sq. ft.; 9½ lbs./gal. Containers: 1-, 5-, and 10-gal. pails; 30- and 55-gal. drums.

Armstrong's Plastic Emulsion — Factory-mixed asphalt emulsion, asbestos fiber, sand, and water, ready for troweling directly on insulation surface in two coats to a total thickness of ⅛" when dry. Coverage—8 sq. ft./gal.; 11 lbs./gal. Containers: 5- and 10-gal. pails; 30-gal. drums.

Armstrong's S. P. Emulsion—Factory-mixed combination of Armstrong's Asphalt Emulsion and asbestos fiber, ready for trowel-

ing directly on insulation surface in two coats to a final thickness of 1/8" when dry. Coverage—8 sq. ft./gal.; 10 lbs./gal. Containers: 5- and 10-gal. pails; 30- and 55-gal. drums. S. P. Emulsion may be mixed with sand for sand finish, using 50 gals. S. P. Emulsion with 175 lbs. (1¾ cu. ft.) dry, screened sand and small amount of water for tempering. Troweled directly to insulation surface in two coats to final thickness of 1/8" when dry. Coverage—9 sq. ft./gal. of S. P. Emulsion.

Armstrong's Insulmastic — A weatherproof, fire-resistant material of heavy troweling consistency for fireproof finish on insulation in refineries and where fire hazards are highly objectionable; for protection of insulation on large tanks, outdoor pipe lines, smoking breechings, ducts, etc. Will not support combusion. Also recommended for high-temperature insulation. Factory-mixed combination of Armstrong's Asphalt Emulsion with special fibers and fillers, black, rubbery in appearance, forms a monolithic coating, unaffected by temperature changes, does not slip or sag at high temperatures, and does not crack or rupture under normal movement. Apply in two coats, each 1/8" thick. Coverage—2 lbs./sq. ft. for two-coat finish or 1 lb./sq. ft. for one coat 1/8" thick; 10 lbs./gal. Containers: 5- and 10-gal. pails; 30- and 55-gal. drums.

Armstrong's Weatherproof Plastic — A weatherproof protective finish for insulation subjected to weather exposure and where fire hazard is not a factor. A plastic mixture of special asphalts, fibers, and fillers, and solvent ready for application; does not slip or sag and is unaffected by temperature. Apply in two 1/16" coats reinforced with Armstrong's saturated membrane between coats. Coverage—1 lb./sq. ft. for two 1/16" coats; 9½ lbs./gal. Containers: 5- and 10-gal. pails; 30- and 55-gal. drums.

Armstrong's Aluminum Cold Storage Paint — Recommended for use over asphaltic surfaces only. Light-reflecting finish, does not discolor due to bleeding through of the asphalt, odorless when dry, does not crack at low temperatures. Coverage—250 sq. ft. (2 coats)/gal.; 10 lbs./gal. Containers: ½- and 1-gal. pails. Shipped as liquid and powder packaged separately to be mixed just before using.

Armstrong's No. 1 Asphaltic Paint—Glossy black finish for Armstrong's Cork Covering and other asphalt mastic and plastic finishes. Moisture resistant when not exposed to weather. Apply once yearly. Coverage—180 sq. ft. (1 brush coat)/gal.; 8½ lbs./gal. Containers: 1/16-, 1/8-, ½-, 1-, and 5-gal. pails.

MISCELLANEOUS

Armstrong's No. 20 Seam Filler—Odorless asphalt mastic for sealing pipe connections to refrigerated cabinets, cases, etc. Thermoplastic (softens in hot water) and does not become hard and brittle. Containers: ½-, 1-, 2-, and 30-lb. packages.

Armstrong's No. 27-B Seam Filler—An asphalt mastic compound for filling joints in Armstrong's Mastic Finish Corkboard and Armstrong's Cork Covering. For low-temperature use, 1 gal. is supplied with every 150 sq. ft. of Mastic Finish Corkboard, 13½ lbs./gal. Containers: ½-, 1-, and 5-gal. pails; 30-gal. drums.

Armstrong's Saturated Membrane—For reinforcing the two coats of Armstrong's Weatherproof Plastic, for waterproofing membrane, and for roof maintenance work. Asphalt saturated cotton, 24 x 26 threads per inch, 4 oz./yd. unsaturated; conforms to A.S.T.M. standards for waterproofing fabric. Supplied in 3-ft. rolls 50 yards long (50 sq. yds.); 47 lbs./roll.

Armstrong's Insulating Paper—Black allcor paper saturated and coated with pure asphalt for use in erection of corkboard in frame construction. Supplied in 500 sq. ft., 36" rolls; 38 lbs./roll.

Armstrong's Copper Clad Steel Wire—A special copper-jacketed steel wire which is drawn from a steel-cored copper billet. It combines the strength of steel with the corrosion resistance of copper. Its principal use is in the application of cork covering. The proper quantity of copper clad steel wire is included as a sundry with every shipment of cork covering. It is available in No. 14, No. 12, and No. 10 gauges. Steel strap is frequently substituted for wire at no extra cost with shipments of large-size covering and with shipments of lagging for cylindrical tanks and vessels and similar equipment in industrial plants. The strap and seals used are stripped and double electro-galvanized to provide high resistance to corrosion. Strap is ½" x .015 and ¾" x .020.

Armstrong's No. 299 Waterproof Cement—Alkali- and acid-resistant waterproof cement for applying cork covering and lagging. Quick setting and strong. Coverage—35 sq. ft./gal. for joint areas; 12 lbs./gal. Containers: 1/16-, 1/8-, ¼-, ½-gal. cans; 1- and 5-gal. pails.

Asbestos Fiber EX-25—A special grade of asbestos fiber for mixture with asphalt emulsion to make the asphalt plastic finish dense, tough, and hard and to keep it from cracking. Furnished in 100-lb. bags.

Armstrong's Fine Regranulated Cork—All cork granules that pass an 8-mesh screen. Packs approximately 5 lbs./cu. ft. Containers: 7-cu. ft. bags.

Armstrong's 8/14 Granulated Cork—Raw (unbaked) cork passing an 8-mesh screen and caught on a 14-mesh screen. Packs approximately 7 lbs. per cubic foot. Containers: 7-cubic ft. bags.

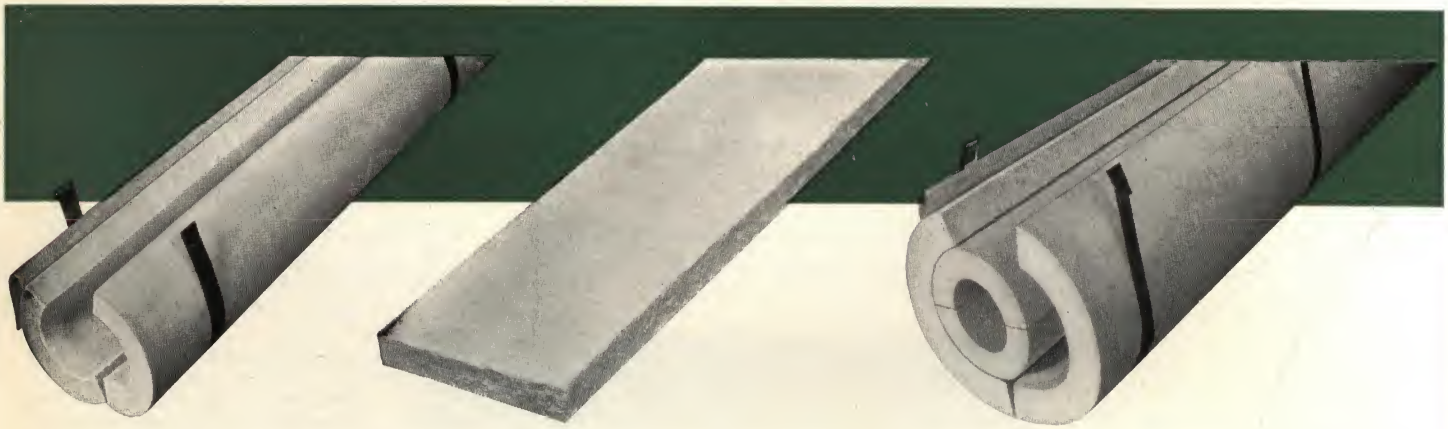
Armstrong's Regranulated Mineral Wool—Packs approximately 10 lbs. per cubic ft. Shipped in paper sacks, 50 lbs. each.

Other Grades—Granulated and regranulated cork is supplied in other grades for specific applications. Weights and other data will be supplied upon request. Write to Armstrong Cork Company, Building Materials Division, Lancaster, Pennsylvania.

ARMSTRONG'S CONTRACT SERVICE FOR HEAT INSULATION

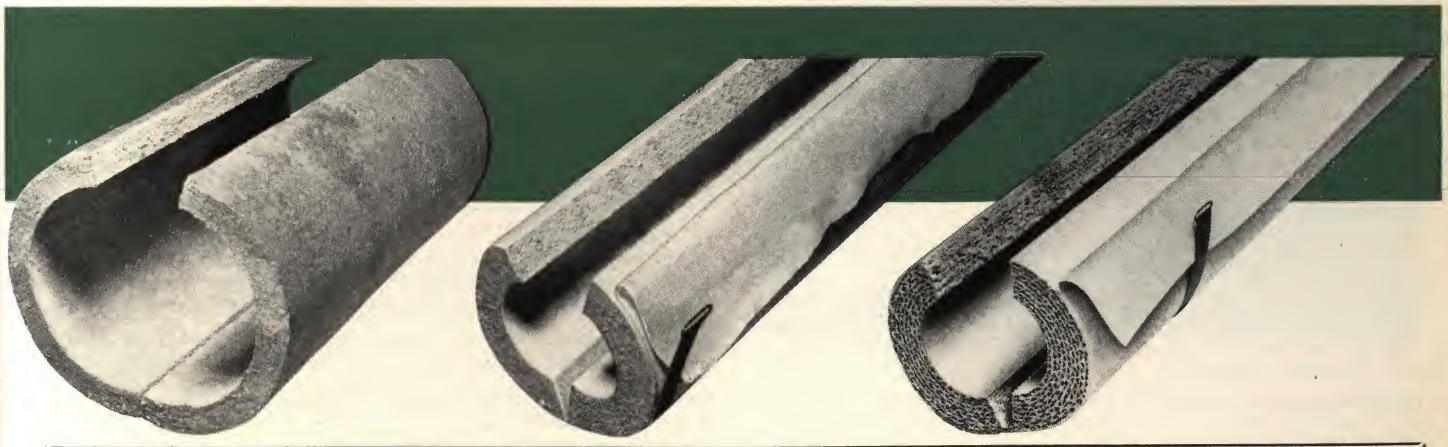
The Armstrong Cork Company has available for contract installation and direct sale in most of the nation's leading industrial areas the complete line of Keasbey and Mattison Pipe Coverings and other Heat Insulation Materials. The Keasbey and Mattison Company's line of insulations has been serving industry for more than sixty-five years and is constantly being improved and augmented to keep pace with the newest developments in heating, power generation, and industrial processing.

Armstrong's Contract Service is fully equipped to handle your heat insulation jobs with the same skill and efficiency that have made Armstrong outstanding in the low-temperature field. Our experienced organization takes full responsibility for every phase of planning, materials, supervision, and installation . . . brings you the advantage of Armstrong's wide engineering background, its materials of tested and proved efficiency, and the skillful workmanship of its mechanics. For complete information, contact your nearest Armstrong Office.



MATERIAL	85% MAGNESIA PIPE COVERING	85% MAGNESIA BLOCK	HY-TEMP. P/C AND BLOCK
Composition	Basic carbonate of magnesia combined with clean asbestos fibers.	Basic carbonate of magnesia combined with clean asbestos fibers.	Diatomaceous earth bonded together with asbestos fibers.
Temperature Range	Up to 600° F.	Up to 600° F.	Up to 1900° F. Used next to the hot surface when temperatures exceed 600° F. to reduce the temperature of the outer side of the Hy-Temp to within the limit of 85% Magnesia.
Sizes	3′ lengths, split horizontally and joined with pasted canvas flaps forming hinge and lap, with necessary bands for application. For pipe sizes up to and including 10″. On order, for 12″ pipe sizes. In 3′ segments for larger pipe.	3″, 6″, 9″, and 12″ wide. All widths are 36″ long.	3′ lengths in tubular half sections. For pipe sizes ½″ to 10″. In 3′ segments for larger pipe. Block sizes same as listed under "85% Magnesia Block."
Thicknesses	Standard, 1½″, 2″, Double Standard, and 3″.	1″ to 4″. Curved blocks 6″ wide in thicknesses from 1½″ to 2½″.	1″ to 3″.

HEAT INSULATION MATERIALS



MATERIAL	KAMATT PIPE COVERING	BESTFELT P/C AND BLOCK	AIR CELL P/C AND BLOCK
Composition	Molded asbestos insulation made from Amosite asbestos fibers and binder.	Built up layers of crimped asbestos paper. Approximately 33 laminations per inch.	Made in three grades. Special Fine Corrugated, Fine Corrugated, and Corrugated. Alternate flat and corrugated layers of asbestos paper.
Temperature Range	Up to 750° F.	Up to 700° F.	Up to 300° F.
Sizes	3′ length sectional covering for pipe sizes 12″ and over.	3′ lengths with canvas jacket and necessary bands. For pipe sizes from ½″ to 6″. Larger sizes on request. Blocks are 6″, 9″, 12″, 18″, and 36″ wide x 36″ long.	3′ lengths with canvas jacket and necessary bands. For pipe sizes from ½″ to 6″. Sheets and blocks are 6″, 9″, 12″, 18″, 36″, and 72″ long x 36″ wide.
Thicknesses	Solid thicknesses of 2″, 2½″, and 3″.	1″ Standard Thickness. Up to 2½″ thicknesses furnished in one layer construction. 3″ supplied in broken joint construction. Blocks are ½″ to 4″ thick.	Approximately ½″ to 1″. Blocks are ½″ to 4″ thick.

MATERIAL	DUPLEX PIPE COVERING	NON-SWEAT PIPE COVERING	NON-FROST PIPE COVERING
Composition	Layers of creped felt with a universal inner liner of specially treated waterproof saturated felt.	Combination of waterproofing and insulating felts. Used to prevent sweating of cold lines.	Layers of cattle hair felt surrounded by layers of paper felt. Used to prevent freezing.
Temperature Range	40° to 212° F.	Used to prevent sweating of cold water lines.	Used to retard freezing of cold water and drain pipes.
Sizes	3′ lengths, with canvas jacket and necessary bands. For ½″ to 3½″ pipe sizes.	3′ lengths with canvas jacket and necessary bands. For ½″ to 4″ pipe sizes.	3′ lengths with canvas jacket and necessary bands. For ½″ to 4″ pipe sizes.
Thicknesses	½″, ¾″, and 1″ in single layer construction. 1″, 1½″, and 2″ in double layer construction.	½″ and ¾″ in single layer construction. 1″, 1½″, and 2″ in double layer construction.	Approximately 1¼″.

MISCELLANEOUS HEAT INSULATIONS

Hair Felt—Conforms to U. S. Navy standards. Used to prevent freezing of cold water lines.

Asbestos Millboard—Used as a protection against fire and heat. It can be supplied with either a smooth or knurled surface. Asbestos Millboard can be readily cut with a saw or knife and can be fastened with nails or screws.

Asbestos Paper and Rollboard—Used for general fireproofing work or where insulation of minimum thickness is required. Composed of clean asbestos fibers combined with a binding material to produce a strong, flexible, and particularly white sheet. Will not disintegrate when wet and regains original strength and whiteness when dried.

High-Temperature Cement—Similar to high-temperature sectional and block insulations, except that it is used in plastic form on irregular surfaces that are difficult to insulate.

Range Boiler Jackets—Furnished in standard sizes to fit all types and sizes of range boilers.

Mineral Wool Insulating Cement—A plastic insulation used principally on boilers, furnaces, ovens, heaters, and steam traps and other irregular surfaces.

85% Magnesia Cement—Similar to 85% magnesia sectional and block insulations, except that it is used in plastic form on irregular surfaces that are difficult to insulate.

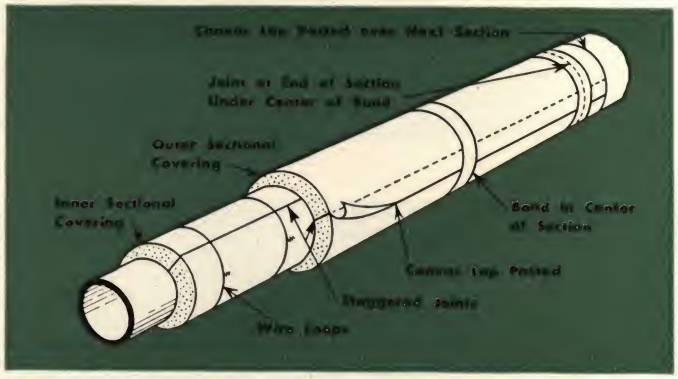
Asbestos Cement—Various types and grades of asbestos cement are furnished for finishes and other applications.

Fibrous Adhesive—A fibrous plastic material used as binding agent in healing insulation work.

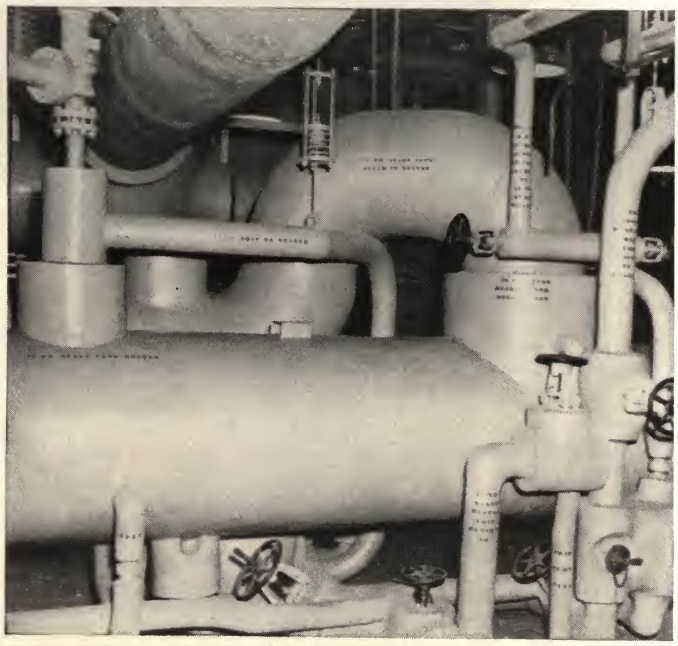
PIPE COVERINGS

Pasted and Banded Half Sections—Apply single layer pipe coverings carefully to the pipe with side and end joints tightly butted. Paste the canvas down smoothly, paying particular attention to the pasting of the lap of canvas over the adjoining section. Apply two metal bands to each section of covering, one band at the midpoint of the section, and one band centered over the end joint.

When applying double layer covering, secure the inner layer, which is not furnished with canvas jacket, to the pipe with not less than three separate loops of 16-gauge annealed iron wire on pipes up to and including 6", and not less than four loops on larger pipes. Twist the ends of all wire loops tightly together, bend them over and tap them into the insulation so that no projection remains. Apply the second layer which is furnished with canvas jacket over the first so that both circumferential and horizontal joints are broken. Paste the canvas down smoothly and apply the metal bands the same as described for single layer application.



Segmental Coverings—Apply segmental pipe covering in two equal layers to make up the thickness specified. Apply it in the same manner as sectional covering, but, as no canvas is attached to the outer surface, both layers should be wired on in the same manner as the inner layer of double layer sectional covering. Apply the proper finish in accordance with the specifications below.



FINISHES FOR PIPE COVERINGS

Sewed Canvas—To pipe covering indoors, apply 40-lb. rosin-sized paper; staple neatly in place to provide a smooth surface. Cover with an 8 oz. canvas jacket, sewed on, with all seams located where they will be least visible, and stitched not less than three stitches to the inch.

Pasted Canvas—Apply either special or factory-weight canvas jacket to provide a smooth surface. Paste down neatly over all laps.

Painting—To paint over canvas jacket, apply one coat of glue sizing before the paint is applied and then paint with two coats of first quality lead and oil paint in the desired color.

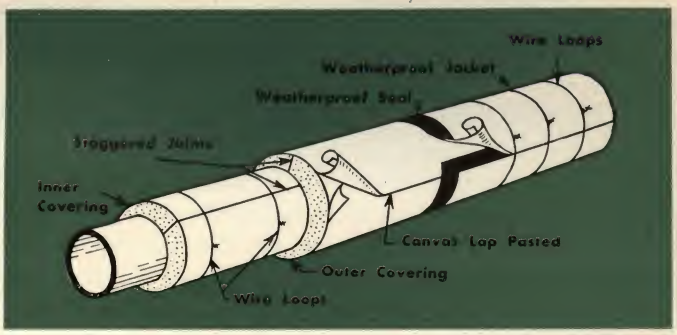
Cement—Apply asbestos cement finishes in two layers, totaling at least ½" in thickness. The last layer should be neatly troweled to form a surface that is smooth and hard.

Hard Finish Cement—Apply hard cement finish in the same manner as cement finish, except for the outer layer, which should be mixed with ⅓ by weight of portland cement.

Outdoor Piping—Cover the insulation with 45-lb. roofing felt, lapped 3″. Lap should be turned down and sealed with Armstrong's Aquaseal. Wire in place with copper or galvanized wire on 4″ centers. If a fire resistant finish is desired, apply 45-lb. asbestos base roofing paper lapped, sealed, and wired on in the same manner as roofing felt.

Cover fitting, valve, and flange insulation with a coating of cement and finish in the same manner as the adjacent piping.

On fittings on lines under 4″ pipe size, an insulation consisting entirely of cement should be applied, in two or more coats, depending upon the total thickness desired. Permit each coat of cement to dry before applying the next coat.



FITTINGS, VALVES, AND FLANGES

Apply insulation on fittings, valves, and flanges to the same total thickness as specified for adjacent piping.

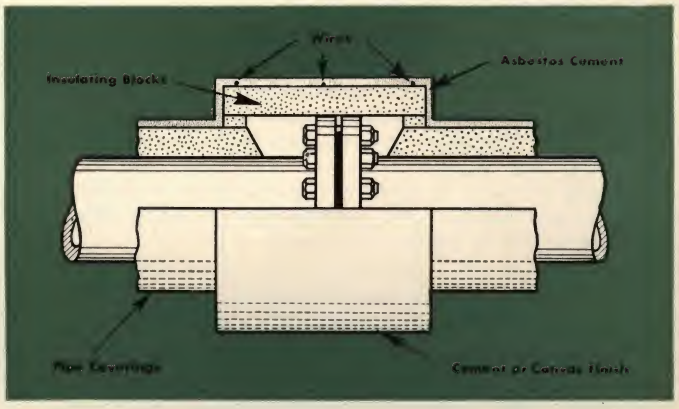
On pipe sized 4″ and larger, carefully fit and wire on blocks of the same material as used on the adjacent piping. Allow for ½″ coating of asbestos cement, which should be applied in two layers and trowelled to a smooth, hard finish.

For pipe sizes under 4″, all cement insulation may be used. Apply asbestos cement, 85% magnesia cement, or high-temperature cement, depending on the operating temperature of the line.

Cement should be applied in two or more layers, depending on the total thickness required, and each layer should be dry before the next is applied.

When insulating flanges, pipe covering should be terminated and beveled far enough away from the flange to permit easy removal of bolts. The insulation on the flanges should extend about 2″ over the adjacent pipe covering.

Pasted or sewed canvas finishes may be applied over the cement surface where specified. However, they should match the finish on the adjacent pipe covering.



BLOCK INSULATION

Secure block insulation in place by means of No. 16 gauge wire or ⅛″ wire cables spaced at 12″ intervals, wrapped around, or attached, to suitable anchorages.

Where two or more layers of block insulation are specified, apply the second and succeeding layers with all joints staggered.

After the block has been applied, stretch and securely fasten hexagonal mesh galvanized wire netting tightly over the entire surface and wire to supporting cables.

FINISHES FOR BLOCK INSULATION

Finish with two layers of asbestos cement of at least ¼″ thickness each. If an extremely hard finish is desired, add to the outer layer ⅓ to ½ by weight of portland cement.

Where block insulation is located outdoors, or protection against excessive moisture is required, apply Armstrong's Insulmastic in two coats, each approximately ⅛″ thick over the regular cement finish. The second layer of the cement finish should be left rough to provide a bond for the Insulmastic.

On high towers, spherical and cylindrical vessels, high elevated equipment, etc., 1″ galvanized wire mesh should be secured directly to the cement finish before Insulmastic is applied.

ARMSTRONG'S INSULATING FIRE BRICK

Armstrong's complete line of insulating fire brick for temperatures from 1600° to 2800° F. permits maximum furnace efficiency. Heat loss can be reduced as much as 80% by incorporating insulating fire brick in refractory walls. Lightweight insulating fire brick also permit furnaces to be brought to operating temperatures in 80 to 90% less time than required for furnaces of heavy fire brick. By preventing heat loss through the walls, these brick insure more accurate furnace temperature control and reduce operating costs. Their light weight simplifies furnace design, and their high physical strength assures longer furnace life and fewer shutdowns.

USE OF INSULATING BRICK

These brick may be used directly exposed as furnace linings or directly behind the refractory as back-up insulation. All types can be used in direct exposure in equipment fired with gas, oil, or powdered fuel. However, insulating fire brick should not be used where they are exposed to molten metal and slags or severe mechanical abrasion. A layer of clay fire brick is recommended for these applications, with Armstrong's Insulating Fire Brick used behind them as back-up insulation.

REFRACTORY CEMENTS

Armstrong's C199 Cement—A newly developed, cold setting refractory cement for laying and facing all types of insulating fire brick and all types of clay fire brick, including super duty. Armstrong's C199 Cement offers exceptional workability and meets every essential engineering requirement. It has high bonding strength, high refractoriness, and low shrinkage characteristics and is easy to handle on the job. This cement will not harden in the drum, even after months of storage, and is ready for immediate use on the job without stirring.

Armstrong's No. 2500 Cement—Designed for laying all types of insulating fire brick for service up to 2500° F. It is a heat setting cement and will not form a ceramic bond, permitting unusually high salvage value of the brick.

Armstrong's No. 2600 Cement—For laying and facing Armstrong's A-23 and A-26 Insulating Fire Brick where a high degree of bond is not necessary. Sets moderately firm on drying and forms a ceramic bond when heated to 1800° F. For an exceptionally firm bond, Armstrong's C199 Cement is recommended.

PHYSICAL PROPERTIES OF ARMSTRONG'S INSULATING FIRE BRICK

Type	A-16	A-20	A-23	A-25	A-26	A-28
Maximum hot face temperature	1600° F.	2000° F.	2300° F.	2500° F.	2600° F.	2800° F.
Flexural Strength (lbs./sq. in.) Test Method: A.S.T.M. C93-39T.	120	70	210	105	225	
Compressive Strength, minimum (Lbs./sq. in.) Test Method: A.S.T.M. C93-39T.	175	175	430	250	325	234
P. C. E. No., minimum Test Method: A.S.T.M. C24-35.	7	29	31	29	33	36
Corresponding Softening Point	2282° F.	2939° F.	3056° F.	2984° F.	3173° F.	3290° F.
Weight per 9-inch straight. Lbs. maximum	1.85	1.90	2.75	2.35	2.80	3.25
Weight, lbs. per cu. ft. maximum	31.6	32.4	47.0	40.2	47.8	55.15
Spalling Loss—Average per cent	0.25	3.0	5.0	9.0	5.0	15.0
Shrinkage, Linear change per cent at maximum hot face temperatures (maximum) Test Method: A.S.T.M. C93-39T, for 24-hour period.	0.5	1.10	1.75	2.00	2.00	2.00
Conductivity, Btu per sq. ft. per hr. per in. thickness at max. mean temperature 400° F.	.890	.846	1.620	1.253	1.753	2.292
1200° F. Test Method: Guarded Hot Plate Method.	1.362	1.532	2.543	2.140	2.532	2.945

REQUIRED THICKNESSES OF INSULATION

This chart is a guide to assist in determining the type and thickness of insulation for industrial applications for temperatures from 300° below zero to 2800° F. Note that several types of insulation frequently are shown in one group. This does not mean that each insulation is equally suited for all applications. Since insulation materials vary in thermal efficiencies and service characteristics, selection of materials should not be made without careful consideration of all job conditions. Your nearest Armstrong office or Armstrong distributor will help you select those materials which are best suited to your specific job conditions or requirements.

Temp.	Lines ¼" Thru 1½"	Lines 2" Thru 7"	Lines 8" Thru 20"	Lines or Equipment 20" to 54"	Lines or Equipment 54" to 120"	Equipment Over 120" and Flat Surfaces
300° to 250°	6" to 8" Wall Thickness Cork Covering	9" to 11" Wall Thickness Cork Covering	12" to 14" Wall Thickness Cork Covering	14" to 16" Cork Lagging	16" to 18" Corkboard	22" Corkboard or 20" C.B. and 3" Foamglas
250° to 200°	5" to 7" Wall Thickness Cork Covering	8" to 10" Wall Thickness Cork Covering	11" to 13" Wall Thickness Cork Covering	13" to 15" Cork Lagging	15" to 17" Corkboard	18" Corkboard or 16" C.B. and 3" Foamglas
200° to 150°	5" to 6" Wall Thickness Cork Covering	7" to 8" Wall Thickness Cork Covering	9" to 11" Wall Thickness Cork Covering	11" to 12" Cork Lagging	12" to 15" Corkboard	15" Corkboard or 13" C.B. and 3" Foamglas
150° to 100°	4" to 5" Wall Thickness Cork Covering	6" to 7" Wall Thickness Cork Covering	8" to 9" Wall Thickness Cork Covering	9" to 10" Cork Lagging	10" to 12" Corkboard	12" Corkboard or 10" C.B. and 3" Foamglas
100° to 50°	H.D.T. Cork Covering To 4" Cork Covering	5" to 6" Wall Thickness Cork Covering	7" to 8" Wall Thickness Cork Covering	8" to 9" Cork Lagging	8" to 10" Corkboard	10" Corkboard or 8" C.B. and 3" Foamglas
50° to 20°	H.D.T. Cork Covering To 4" Cork Covering	4" to 5" Wall Thickness Cork Covering	5" to 6" Wall Thickness Cork Covering	6" to 7" Cork Lagging	7" to 9" Corkboard	10" Corkboard or 8" C.B. and 3" Foamglas
20° to 0°	H.D.T. Cork Covering	H.D.T. Cork Covering	H.D.T. Cork Covering To 5" Cork Covering	5" to 6" Cork Lagging	6" to 8" Corkboard	8" Corkboard or 10" Mineral Wool Board or 12" Foamglas or 6" C.B. and 3" Foamglas
0° to 20°	Standard Thickness Cork Covering	Standard to H.D.T. Cork Covering	H.D.T. Cork Covering	4" Cork Lagging	4" to 6" Corkboard	6" Corkboard or 7" Mineral Wool Board or 9" Foamglas or 4" C.B. and 3" Foamglas
20° to 50°	Light Duty to Standard Thickness Cork Covering	Standard Thickness Cork Covering	Standard Thickness Cork Covering	3" Cork Lagging	3" to 4" Corkboard	5" Corkboard or 6" Mineral Wool Board or 8" Foamglas or 3" C.B. and 3" Foamglas
50° to 100°	Light Duty Thickness Cork Covering or ½"–2" Hairfelt or ½"–2" Non-Sweat P.C. or ½"–2" Woolfelt P.C.	Light Duty Thickness Cork Covering or ½"–2" Hairfelt or ½"–2" Non-Sweat P.C. or ½"–2" Woolfelt P.C.	Light Duty Thickness Cork Covering or ½"–2" Hairfelt or ½"–2" Woolfelt P.C.	2" Cork Lagging or ½"—2" Hairfelt	2" Corkboard or ½"—2" Hairfelt	2" Corkboard or 3" Mineral Wool Board or 4" Foamglas
100° to 200°	1" Woolfelt P.C. or 1" Aircell P.C. or Std. Thick 85% Mag. P.C.	1" Woolfelt P.C. or 1" Aircell P.C. or Std. Thick 85% Mag. P.C.	1" Woolfelt P.C. or 1½" Aircell P.C. or Std. Thick 85% Mag. P.C.	1½" Aircell Block or 1" to 1½" 85% Mag. Block or 1" Mineral Wool Blanket	1½" Aircell Block or 1" to 1½" 85% Mag. Block or 1" Mineral Wool Blanket	1½" Aircell Block or 1" to 1½" 85% Mag. Block or 1" Mineral Wool Blanket
200° to 250°	1" Aircell P.C. or Std. Thick 85% Mag. P.C. or 1" Bestfelt P.C.	1" Aircell P.C. or Std. Thick 85% Mag. P.C. or 1" Bestfelt P.C.	1½" Aircell P.C. or Std. Thick 85% Mag. P.C. or 1½" Bestfelt P.C.	1½" Aircell Block or 1½" 85% Mag. Block or 1½" Bestfelt Block or 1½" Mineral Wool Blanket	1½" Aircell Block or 1½" 85% Mag. Block or 1½" Bestfelt Block or 1½" Mineral Wool Blanket	1½" Aircell Block or 1½" 85% Mag. Block or 1½" Bestfelt Block or 1½" Mineral Wool Blanket
250° to 300°	1" Aircell P.C. or Std. Thick 85% Mag. P.C. or 1" Bestfelt P.C.	1" Aircell P.C. or Std. Thick 85% Mag. P.C. or 1" Bestfelt P.C.	1½" Aircell P.C. or Std. Thick 85% Mag. P.C. or 1½" Bestfelt P.C.	1½" Aircell Block or 1½" 85% Mag. Block or 1½" Bestfelt Block or 1½" Mineral Wool Blanket	1½" Aircell Block or 1½" 85% Mag. Block or 1½" Bestfelt Block or 1½" Mineral Wool Blanket	1½" Aircell Block or 1½" 85% Mag. Block or 1½" Bestfelt Block or 1½" Mineral Wool Blanket
300° to 350°	Std. Thick 85% Mag. P.C. or 1" Bestfelt P.C.	Std. Thick to 1½" 85% Mag. P.C. or 1½" Bestfelt P.C.	1½" 85% Mag. P.C. or 1½"—2" Bestfelt P.C.	1½" 85% Mag. Block or 1½"—2" Bestfelt Block or 1½" Mineral Wool Blanket	1½" 85% Mag. Block or 1½"—2" Bestfelt Block or 1½" Mineral Wool Blanket	1½" 85% Mag. Block or 1½"—2" Bestfelt Block or 1½" Mineral Wool Blanket
350° to 400°	Std. Thick 85% Mag. P.C. or 1" Bestfelt P.C.	1½" to 2" 85% Mag. P.C. or 1½"—2" Bestfelt P.C.	2" 85% Mag. P.C. or 2" Bestfelt P.C.	2" 85% Mag. Block or 2"—2½" Bestfelt Block or 2" Mineral Wool Blanket	2" 85% Mag. Block or 2"—2½" Bestfelt Block or 2" Mineral Wool Blanket	2" 85% Mag. Block or 2"—2½" Bestfelt Block or 2" Mineral Wool Blanket
400° to 500°	1½" 85% Mag. P.C. or 1½" Bestfelt P.C.	2" to Dbl. Std 85% Mag. P.C. or 2" Bestfelt P.C.	Dbl. Std. 85% Mag P.C. or 2½"—3" Bestfelt P.C.	3" 85% Mag. Block or 3"—3½" Bestfelt Block or 2" Mineral Wool Blanket	3" 85% Mag. Block or 3"—3½" Bestfelt Block or 2" Mineral Wool Blanket	3" 85% Mag. Block or 3"—3½" Bestfelt Block or 2" Mineral Wool Blanket
500° to 600°	2" 85% Mag. P.C. or 2" Bestfelt P.C.	Dbl. Std. to 3" 85% Mag. P.C. or 2½" Bestfelt P.C	3" 85% Mag. P.C. or 3" Bestfelt P.C.	3" 85% Mag. Block or 3"—3½" Bestfelt Block or 2½" Mineral Wool Blanket	3" 85% Mag. Block or 3"—3½" Bestfelt Block or 2½" Mineral Wool Blanket	3" 85% Mag. Block or 3"—3½" Bestfelt Block or 2½" Mineral Wool Blanket
600° to 700°	2" Bestfelt P.C. or 2" Hy-Temp. P.C. Comb. 1½" Hy-Temp. and 1½" 85% Mag. P.C.	3" Bestfelt P.C. or Comb. 1½" (Nominal) Hy-Temp. and 1½" 85% Mag. P.C.	3½" Bestfelt P.C. Comb. 1½" Hy-Temp and 1½" 85% Mag. P.C.	4" Bestfelt Block Comb. 1½" Hy-Temp. and 2½" 85% Mag. Block or 2½" Mineral Wool Blanket	4" Bestfelt Block Comb. 1½" Hy-Temp. and 2½" 85% Mag. Block or 2½" Mineral Wool Blanket	4" Bestfelt Block or Comb. 1½" Hy-Temp. and 2½" 85% Mag. Block or 2½" Mineral Wool Blanket
700° to 800°	2" Hy-Temp. P.C or Comb. 1½" Hy-Temp. and 2" 85% Mag. P.C.	Comb. 1½" (Nominal) Hy-Temp. and 2" 85% Mag. P.C.	Comb. 1½" (Nominal) Hy-Temp and 2" 85% Mag. P.C	Comb. 2½" Hy-Temp and 2" 85% Mag. Block or 3" Mineral Wool Blanket	Comb. 2½" Hy-Temp. and 2" 85% Mag. Block or 3" Mineral Wool Blanket	Comb. 2½" Hy-Temp. and 2" 85% Mag. Block or 3" Mineral Wool Blanket
800° to 1000°	2" Hy-Temp. P.C. or Comb. 2" Hy-Temp. and 2" 85% Mag. P.C.	Comb. 2" Hy-Temp. and 2" 85% Mag. P.C.	Comb. 3" Hy-Temp. and 2" 85% Mag. P.C.	Comb. 3" Hy-Temp. and 2" 85% Mag. Block or 3" to 3½" Min. Wool Blanket	Comb. 3" Hy-Temp. and 2" 85% Mag. Block or 3" to 3½" Min. Wool Blanket	Comb. 3" Hy-Temp. and 2" 85% Mag. Block or 3" to 3½" Min. Wool Blanket
1000° to 1200°	2" Hy-Temp. P.C. or Comb. 2" (Nominal) Hy-Temp. and 2" 85% Mag. P.C.	Comb. 2" Hy-Temp. and 2" 85% Mag. P.C.	Comb. 3" Hy-Temp. and 2" 85% Mag. P.C.	Comb. 3½" Hy-Temp. and 1½" 85% Mag. Block or 4" Mineral Wool Blanket	Comb. 3½" Hy-Temp. and 1½" 85% Mag. Block or 4" Mineral Wool Blanket	Comb. 3½" Hy-Temp. and 1½" 85% Mag. Block or 4" Mineral Wool Blanket
1200° to 1400°				Comb. 5½" Hy-Temp. and 2" 85% Mag. Block or A-16 Insulating Fire Brick	Comb. 5½" Hy-Temp and 2" 85% Mag. Block or A-16 Insulating Fire Brick	Comb. 5½" Hy-Temp. and 2" 85% Mag. Block or A-16 Insulating Fire Brick
1400° to 1600°				Comb. 6" Hy-Temp. and 1½" 85% Mag. Block or A-16 Insulating Fire Brick	Comb. 6" Hy-Temp. and 1½" 85% Mag. Block or A-16 Insulating Fire Brick	Comb. 6" Hy-Temp. and 1½" 85% Mag. Block or A-16 Insulating Fire Brick
1600° to 1800°				6" Hy-Temp. Block or A-20 Insulating Fire Brick or Combination of Both	6" Hy-Temp. Block or A-20 Insulating Fire Brick or Combination of Both	6" Hy-Temp. Block or A-20 Insulating Fire Brick or Combination of Both
1800° to 2800°				A-20 Insulating Fire Brick (2000° Top Temp. Limit) A-23 Insulating Fire Brick (2300° Top Temp. Limit) A-25 Insulating Fire Brick (2500° Top Temp. Limit) A-26 Insulating Fire Brick (2600° Top Temp. Limit) A-28 Insulating Fire Brick (2800° Top Temp. Limit)		

SYMBOLS: H.D.T.—Heavy Duty Thickness; C.B.—Corkboard; P.C.—Pipe Covering; Comb.—Combination Covering; M.W.B.—Mineral Wool Board

ARMSTRONG'S BUILDING MATERIALS

Floors
Asphalt Tile
- Standard
- Industrial
- Greaseproof
- Conductive

Linotile® (Oil-Bonded)
Rubber Tile
Cork Tile
Linoleum

Walls and Ceilings
Monowall®
Temlok® De Luxe
Linowall®
Veos Wall Tile

Acoustical Materials
Arrestone®
Cushiontone®
Corkoustic®

Insulations
Low Temperature
- Corkboard
- Cork Covering
- Foamglas*
- Fiberglas**
- Mineral Wool Board

Heat Insulations
- 85% Magnesia
- Air Cell
- High Temperature
- Other Heat Insulations

Insulating Refractories
Comfort Insulations
Corkboard and Temlok Roof Insulation
Temlok Lath
Temseal® Sheathing

*® Pittsburgh Corning Corp.
**® Owens-Corning Fiberglas Corp.

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Seattle 4, Wash.	Asbestos Supply Co. of Seattle
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